52

Light and LIGHTING

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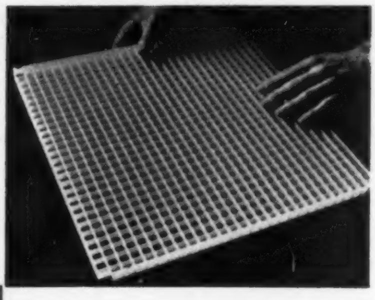

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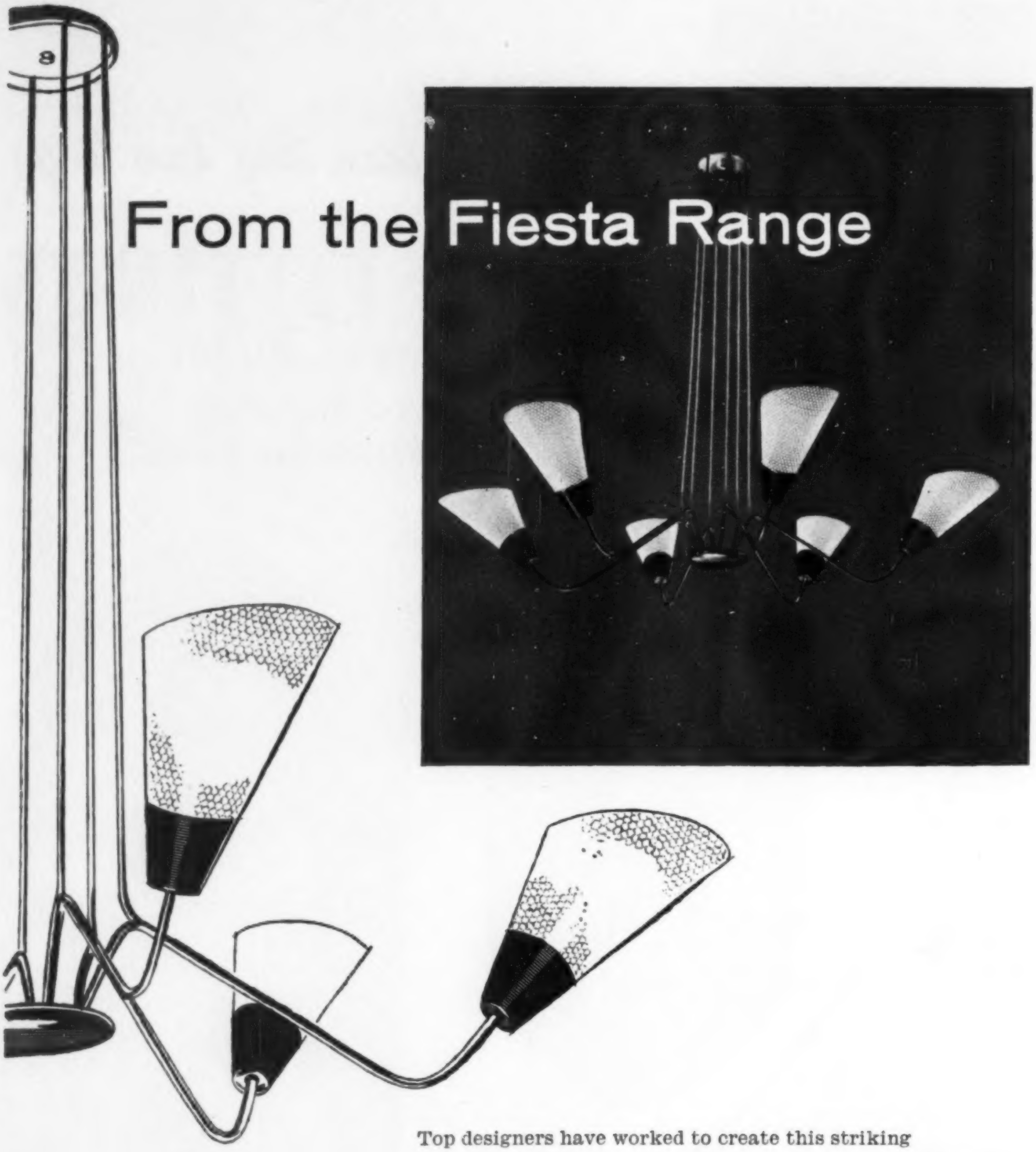

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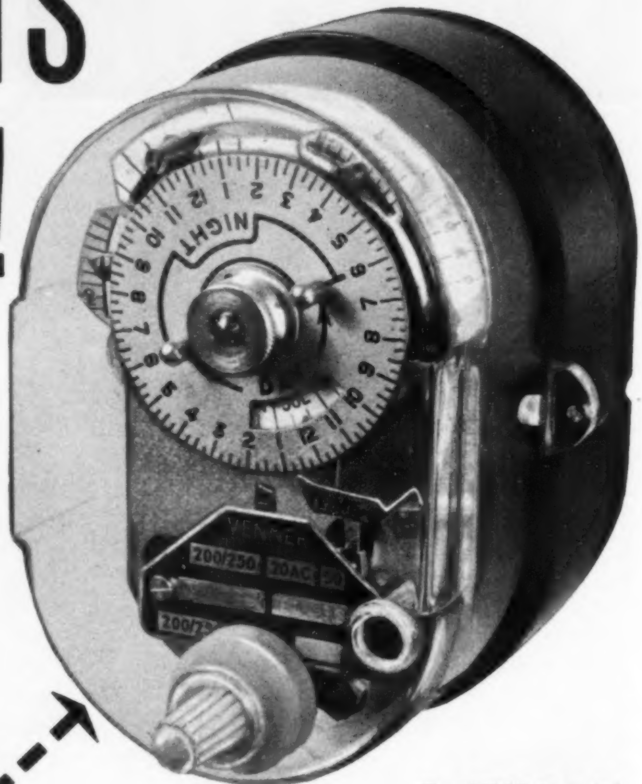

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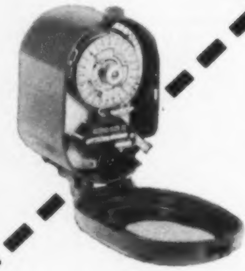

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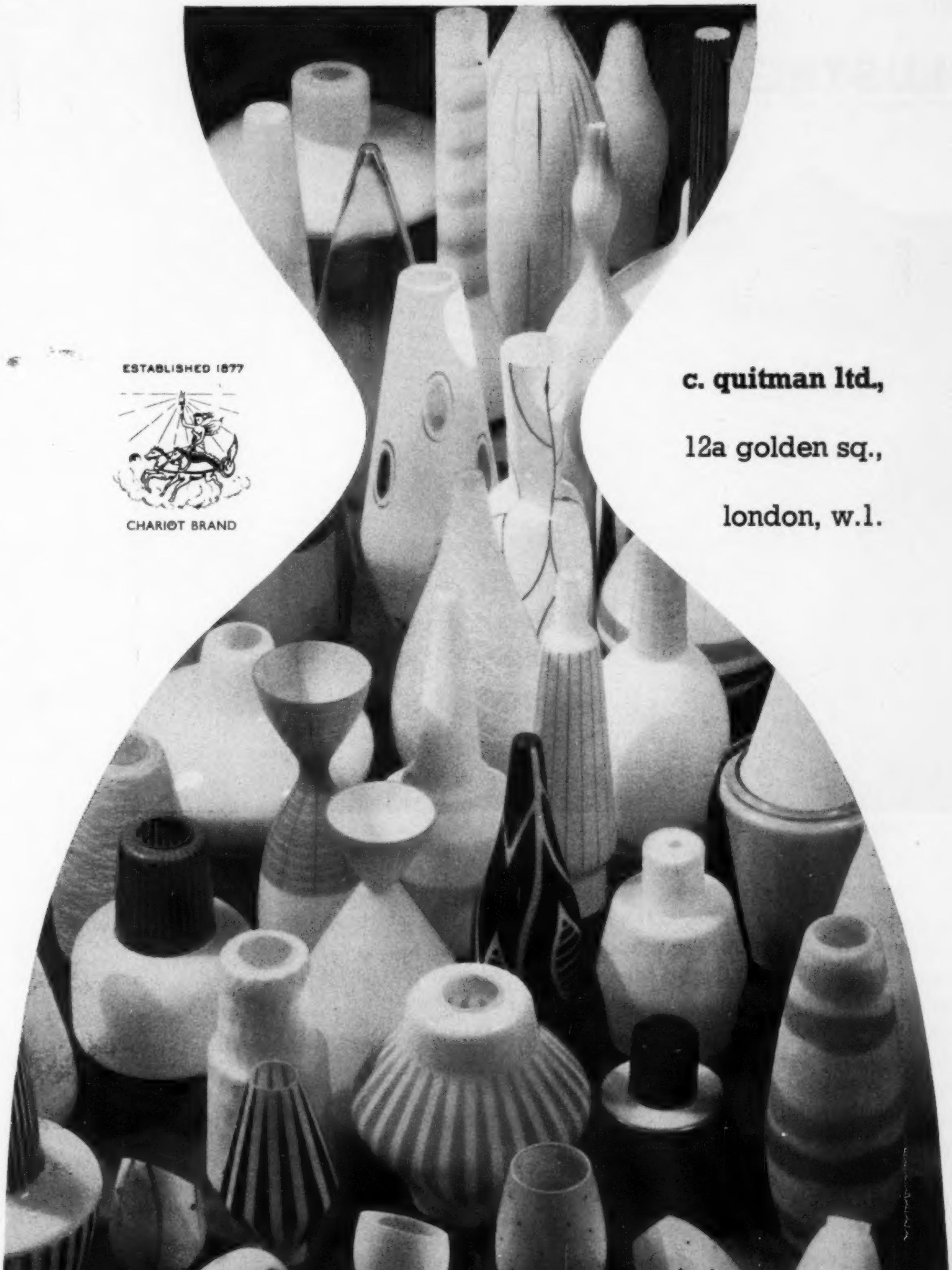

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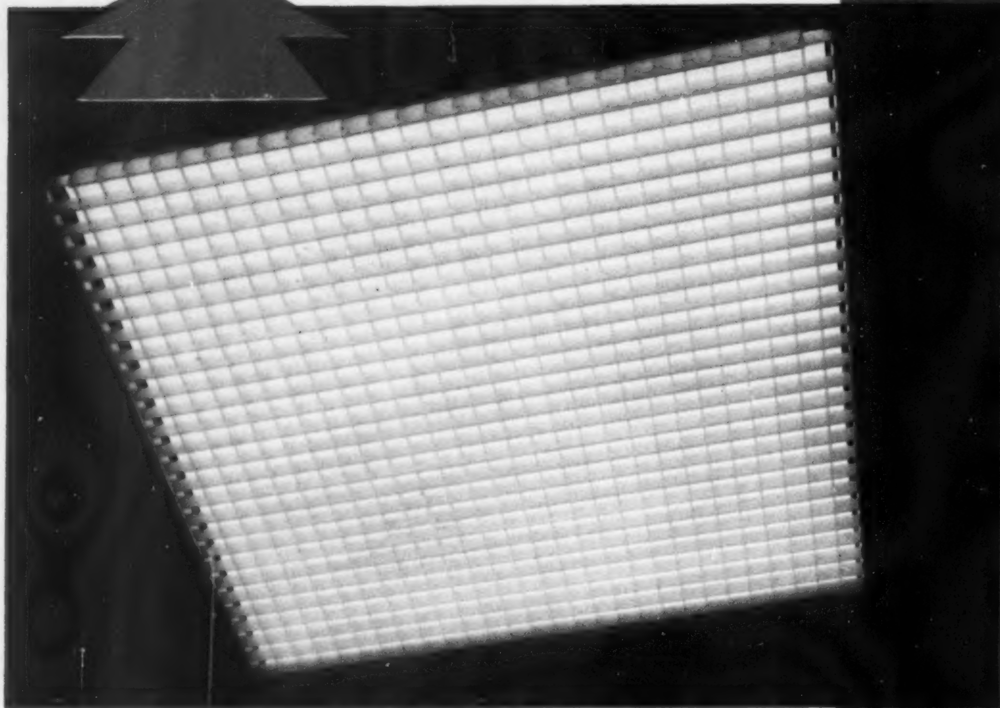

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Light and
LIGHTING

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contents

Good Lighting for Good Living

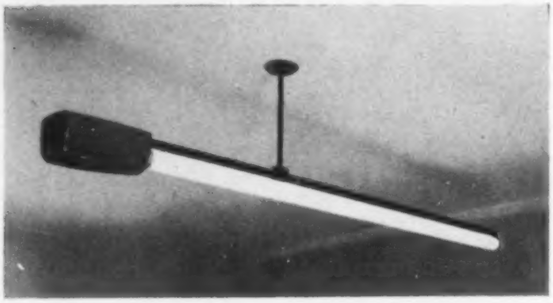
The 'standard of living' has been rising steadily through the years and there is no doubt that those of our politicians who occasionally remind us that "We have never had it better" are stating a matter of fact. Utopia is not yet established—nor will it ever be. Nevertheless, life in our own pleasant land has grown more agreeable for an increasing majority of us than ever before. Amenities have multiplied and become more and more widely enjoyed. Among them, what were luxuries 'yesterday'—available only to the fortunate few—have entered into the standard of living of the many. Even good artificial lighting was rare in the opening years of the present century. Now it is rarer than it should be, or need be, even though—on the whole—there is a continuous trend in the direction of more generous and better planned lighting. Of course the amenities afforded by lighting are not simply a matter of levels of illumination—though these are important. Other of its characteristics contribute largely to the agreeableness or disagreeableness of lighting. One of the reasons why recommendations for good lighting have changed from time to time—and are likely to change again—is that "the standard of living" is not static and it embraces standards of lighting.

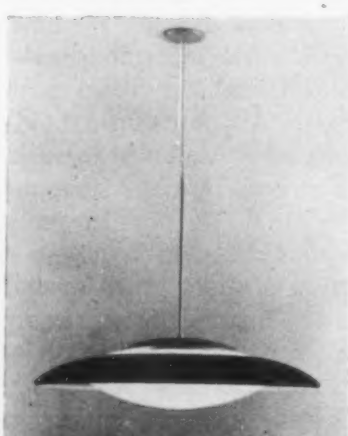
Notes and News

THIS year sixteen products have been chosen by the panel of judges appointed by the Council of Industrial Design as the Designs of the Year, 1959. Only items which have been shown in the Design Centre during 1958 were eligible for selection. We have come to expect that the lighting industry will get one of the awards—indeed we would be very disappointed if it did not. Last year's list of 20 awards included one to a lighting firm. This year's list of 16 includes two awards—to Atlas Lighting for their "Kitchenlight" designed by John and Sylvia Reid, and to Merchant Adventurers for their "Ellipse" series fittings designed by Paul Boissevain.

The comments of the judges on these two fittings were as follows:—

On the "Kitchenlight": "The adaptation of fluorescent lighting for use in the home has the slender, decorative look of a mobile. It is the first fluorescent fitting designed to hang from one point, so that fixing and servicing are made easy. It is unusually slim in appearance, because the normal type of control gear has been exchanged for a ballast lamp. This has, of course, resulted in the lighting being a little warmer than usual. It is unfortunate that such an attractive fitting is available in only one colour."





Lighting fittings included in the 1959 Designs of the Year. Above, the Atlas 'Kitchenlight' designed by John and Sylvia Reid; left, Merchant Adventurers 'Ellipse' fitting designed by Paul Boissevain.

On the Merchant Adventurers "Ellipse" fitting they say: "This fitting, made in five sizes, is carefully detailed and does its job well. It has a spun aluminium reflector available in six colours, with a British made white opal glass, and suspension parts of anodised aluminium in satin silver or pale gold. With the exception of the two smallest sizes, both upward and downward light is obtained. The fitting is modern in appearance and would seem appropriate in many well-designed settings."

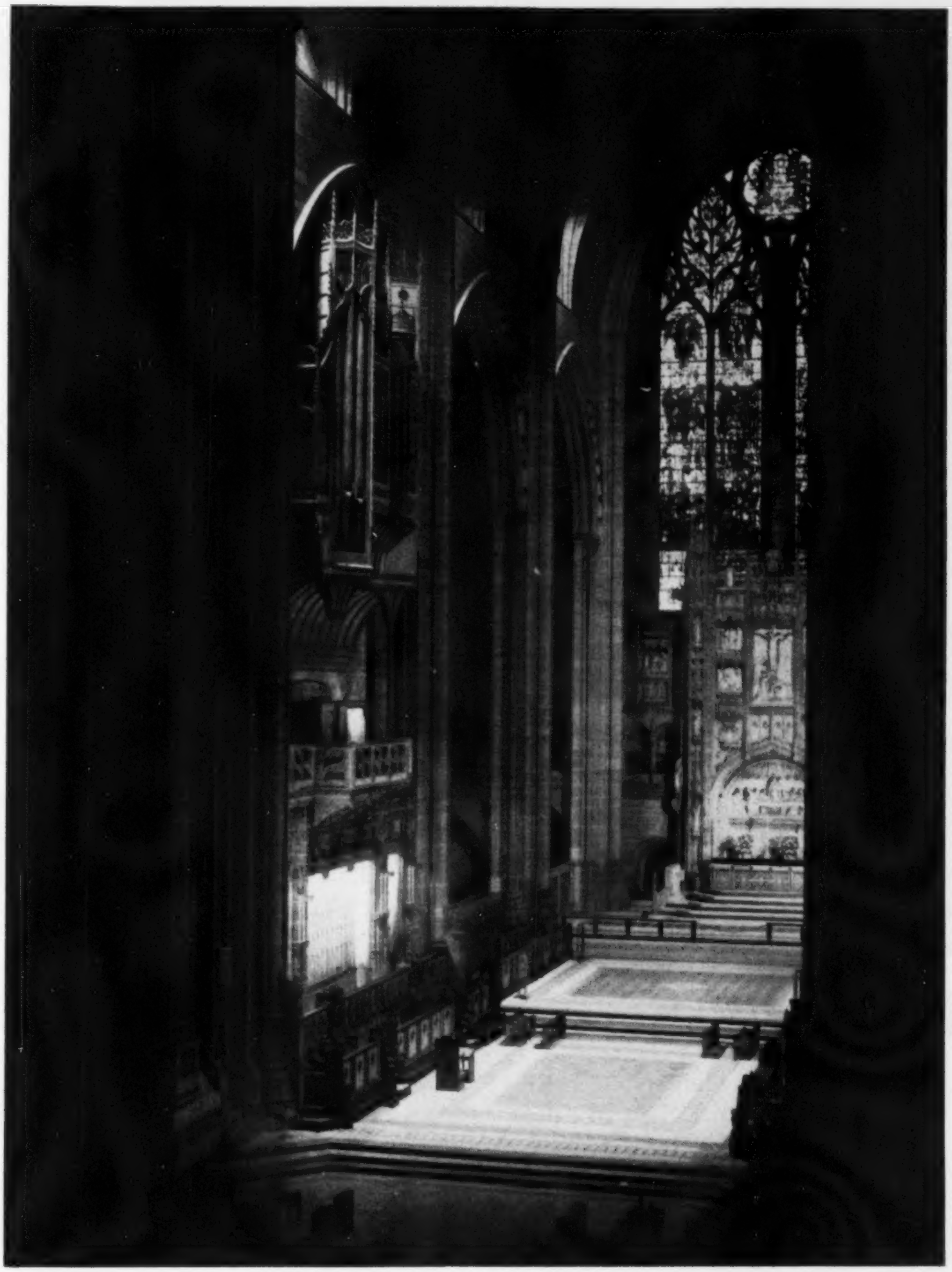
For some reason which we have never quite understood, though the awards are made for a design, they are actually presented to the manufacturers of the chosen products and not to the people who have produced the designs. The manufacturers are, of course, to be congratulated on their enterprise in accepting such good designs, but that is really only sound business. Perhaps it is to stimulate and comfort the designer that the Duke of Edinburgh's Prize for Elegant Design has been introduced.

A point of interest about the two lighting fittings which have been honoured this year is that both were designed by architects. The Reid team and Paul Boissevain are well known for their elegant designs and we look forward to the time when they receive the Duke of Edinburgh's prize.

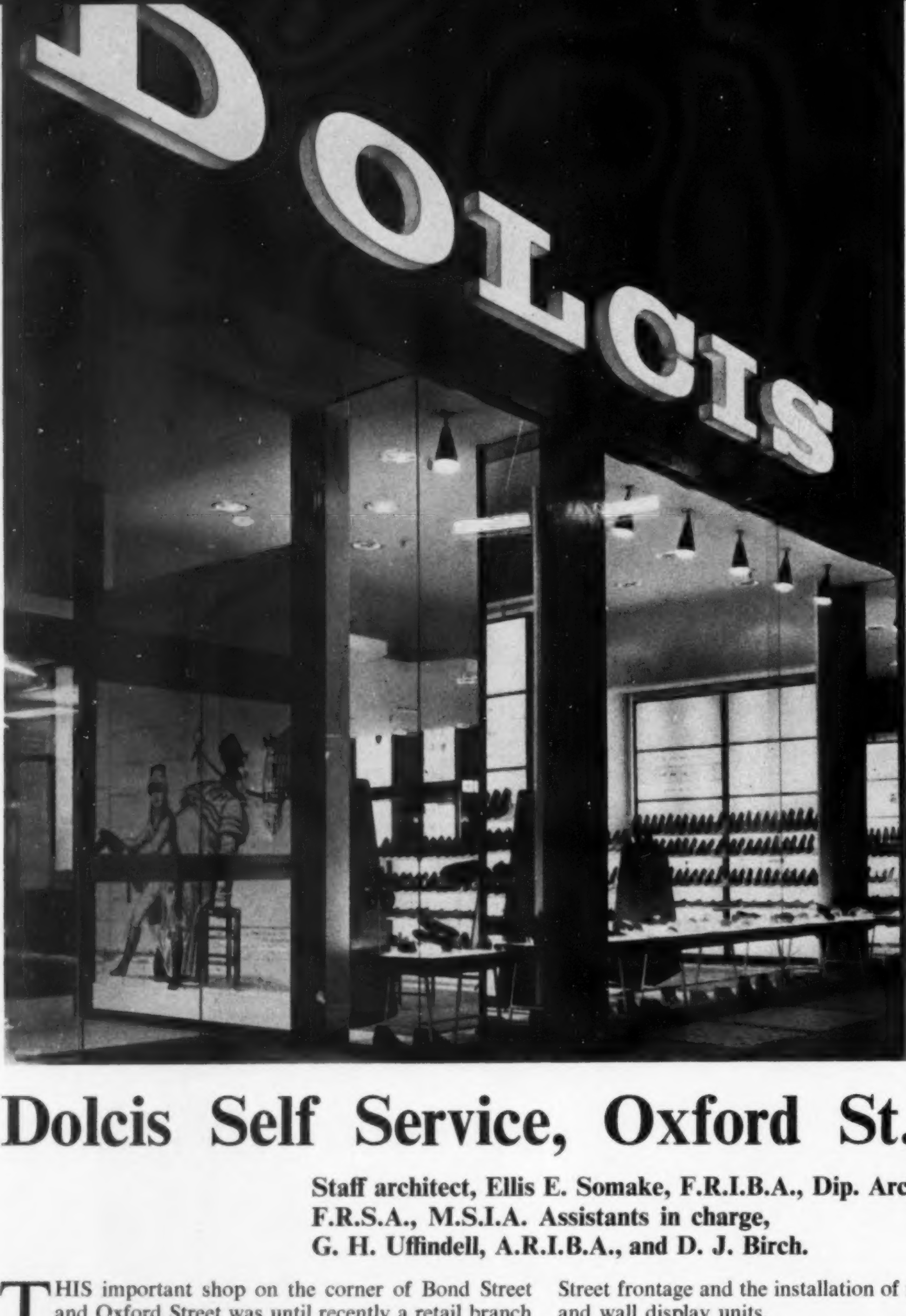
Lighting Codes

A meeting of the IES at which the levels of illumination which are recommended in different countries are to be discussed is to be held on Wednesday, July 8th, at the Federation of British Industries. Those taking part include Dr. Blackwell and Mr. Crouch, of the U.S.A., and Dr. Dresler, of Australia. It is hoped that a representative of the USSR will also be present. Readers can hardly be unaware of the differences now existing in the codes of various countries and the meeting on July 8th ought to be a very instructive one. The meeting will begin at 6 p.m.

Some time ago we mentioned that a translation of the Russian recommendations was being made. This is now available in the form of two documents (*i*) the Russian industrial lighting code consisting of building norms and rules, by the USSR Ministry of Building, and (*ii*) Classification of visual tasks, by A. S. Shakevich, of the Leningrad Industrial Health Institute. The two documents, which include all diagrams, etc., can be obtained from the Permagon Institute, 4, Fitzroy Square, London, W.1, price £7, or from their New York office, price 20 dollars.



The lighting system installed in the choir
and chancel of Liverpool Cathedral
for concerts of sacred music
is to be retained for permanent use.
The system was designed by the GEC Ltd.



Dolcis Self Service, Oxford St., W.1

Staff architect, Ellis E. Somake, F.R.I.B.A., Dip. Arch. (Lon.), F.R.S.A., M.S.I.A. Assistants in charge, G. H. Uffindell, A.R.I.B.A., and D. J. Birch.

THIS important shop on the corner of Bond Street and Oxford Street was until recently a retail branch of Trueform. When taken over by Dolcis the premises were converted to provide a self-service sales floor at ground level (70 ft. x 50 ft. in area) and an assisted-service sales floor (60 ft. x 30 ft. in area) in the basement hitherto used as a stockroom. The adjacent men's department was incorporated into the ground floor scheme.

Shop fronts were retained, though the window backs were removed and new platforms were installed. The main work carried out inside consisted of the erection of a suspended ceiling with a scalloped edge to the Bond Street frontage and the installation of new perimeter walls and wall display units.

The main lighting of the ground floor comes from these units and from island display units of similar form. The backs of the units comprise panels of white translucent plastic 4 ft. wide, concealing vertical lines of fluorescent lamps—two lines to each panel—against which the shoes are seen silhouetted. Wall bays are two panels wide and 9 ft. 6 in. high, the panels, with their moulded lettering, being removable for rearrangement and re-lamping.

Additional light comes from 200-w. semi-recessed downlights of special design. They consist of simple

Opposite page, new style "Dolcis" illuminated sign with 2 ft. high letters with white "Perspex" fronts and red "Perspex" returns. Existing window lighting has been supplemented by a row of adjustable spotlights in spun-metal housings. Right, ground floor self-service sales area. The main lighting comes from the illuminated back panels of the wall and island display units (see close-up below). Extra light is provided by rows of louvred downlights semi-recessed into the suspended ceiling. Specially designed, these fittings have rims of expanded aluminium anodised in various colours.

metal shells, easily cleaned white plastic concentric louvres and expanded aluminium rims anodised in various colours.

The existing window lighting—mainly egg-crate units concealing fluorescent lamps in the window soffits—has been retained. In addition, however, a row of adjustable spotlights has been fixed to the edge of the true ceiling along the Bond Street frontage and one of the internally illuminated display units (as described above) has been placed at the back of the window of the men's department.

The new staircase—a dominant feature of the store, as of most Dolcis branches—has suspended over it elliptical shaped fittings of opal glass. Protruding from the staircase wall are a series of marble fins, each concealing two rows of fluorescent lamps, which light the white background and are reflected from the chains of

semi-mobile aluminium "shapes" that form a decorative element of this wall.

The basement sales floor is lit by a series of 2 ft. 6 in. square plastic trays, in groups of four, each rectangular panel concealing four 4 ft. fluorescent lamps. In addition there are three rows of semi-recessed louvred spotlights with perforated rims. In a low-ceilinged circulation area large shallow cupolas are lit by cold-cathode tubing concealed around the rims, while the counter receives extra light from a row of adjustable spotlights in spun-metal housings.

External lighting, comprising internally illuminated signs, includes a new-style DOLCIS sign (one on each frontage) in isolated expanded Egyptian letters 2 ft. high. They project 6 in. from the fascia, with fronts of white opal "Perspex" and returns of red "Perspex."

Above, assisted-service sales floor in basement. Lighting is mainly from rectangular units each comprising four 2 ft. 6 in. square plastic panels concealing banks of fluorescent lamps. Extra light comes from three rows of semi-recessed louvred downlights, while wall display units are lit by fluorescent lamps concealed by perforated pelmets above and below.

Electrical contractor and lighting fittings, Courtney, Pope (Electrical) Ltd.; other lighting fittings, George Forrest (1950) Ltd.

Railway Floodlighting at Crewe

A description of the method being used in the design of the new high tower lighting installation in the marshalling yards and sidings at Crewe.

By G. K. LAMBERT* B.Sc. (Eng.), A.C.G.I., D.I.C. A.M.I.Mech.E., A.M.I.E.E.

and J. F. PARKS†

With the electrification of the Manchester-Crewe main line of the London Midland Region, British Railways, it was decided to replace the lighting of marshalling yards and sidings to the North and South of Crewe Station by high tower lighting. Better illumination was needed to deal with the denser traffic expected but equally it was necessary to clear the clutter of several hundred 25-ft. poles to make way for the catenary suspensions for the overhead electricity supply. British Railways selected locations for the twelve 150-ft. towers and specified levels of illumination from 0.15 to 0.5 lm/sq. ft. over particular areas.

Design of the new installation by conventional methods would have been excessively laborious and this was one of the first installations to be planned using the spherical chart method described in *Light and Lighting*, July, 1957. Even then considerable work was involved because of the extent of the installation: the irregularity of the areas and variation of illumination specified made it necessary to deal with each area separately.

Two further new techniques were used. The planning was checked by means of point-by-point calculation of illumination by digital computer and finally a method of floodlight aiming was used in which the individual floodlights were aimed in the same way as artillery. For this a Director No. 12 Mk. 1 and a field clinometer were used.

The first stage, of four towers near the station, was completed in September. It was a matter of great satisfaction that the floodlights were installed and went into service without further adjustment. Illumination measurements have confirmed that performance is to specification. The installation has helped to speed up the work of electrification.

Installation Details

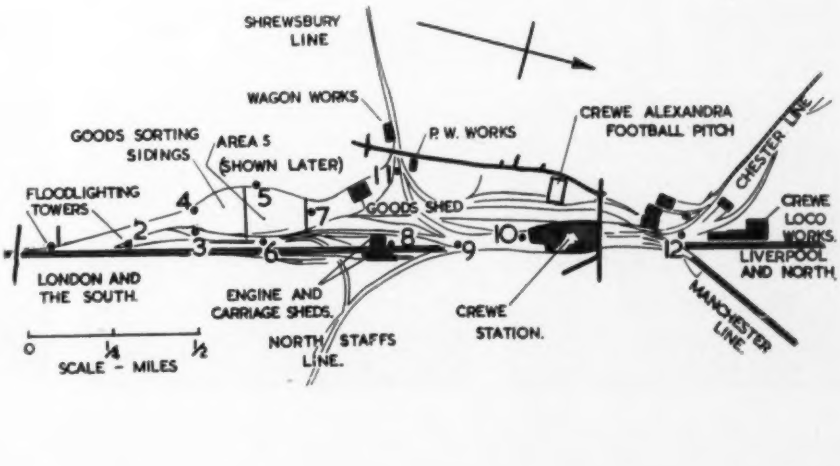
The extent of the areas which had to be lit and totalling over half a million square yards is indicated in Fig. 1, which also shows the positions of the twelve 150-ft. towers which will form the complete installation. The towers are of galvanised steel lattice and on completion each face will carry up to ten M25 projectors suspended by stirrups from built-up channel members in two rows of five. (Fig. 2.)

Each stirrup is held by a central 5/8 in. Whit. stainless steel bolt and is located in azimuth by a 5/16 in. B.S.F. bolt. The projectors are locked at the required vertical aim by means of a J-clamp on a quadrant attached to the left-hand trunnion of the floodlight housing, as well as by tightening the trunnion bolt. A stop bolt is also fitted in the quadrant so that when the floodlight has been turned over for cleaning the front glass, it can be returned to its correct position by bringing the flat of the head of the stop bolt against the stirrup edge. Relamping is done from the back; the whole cap assembly can be removed, complete with lamp after loosening three swing bolts.

The lampholder can be moved axially between guides under the control of an external focusing knob. After relamping and switching on, the lamp filament can readily be adjusted to correct focus by means of this

* Application Development, A.E.I. Lamp & Lighting Co., Ltd., Leicester.
† Lighting Sales, A.E.I. Lamp & Lighting Co., Ltd., Leicester.

Fig. 1. Extent of the present floodlighting installation showing locations of the 150 ft. towers and of Area 5 which is used as an example of the method of design.



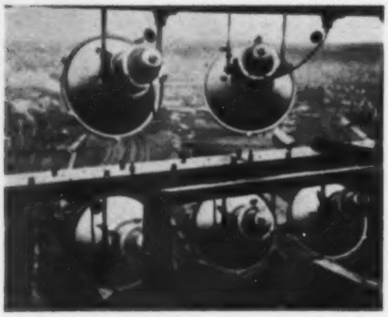


Fig. 2. M.25 floodlights mounted on one face of a tower.

Fig. 3 (right). Tower 9 of the installation seen from the south.

knob and an indicator specially designed and fitted to conform to the British Railways specification. This is in effect a small pinhole camera with a circular diffusing screen. Even in sunlight a clear image of the lamp filament can be seen on the screen and it is only necessary to adjust the focusing knob to centralise this image.

Each floodlight has its own weatherproof electricity supply socket which has an interlock switch to prevent removal or replacement when it is switched on.

The electricity supply is by 6.6kV ring main to a 3-phase transformer at the base of each tower; switching can be done locally or by central control. Some 12 miles of distribution cable were used.

Planning of the Installation

To illustrate the new method of planning employed, the check by electronic computer and aiming, Area 5 (see Fig. 4) covering the northern part of the goods sorting sidings is examined below in detail.

The characteristic of the spherical chart which makes it so useful is that the beam coverage from a floodlight is constant in area and shape for all angles of aim: planning can be done on the basis of total intensity required from the bank of floodlights in various directions. Ingenuity and experience are still needed to build up the intensities by the most economical superposition of beams (or candle power distribution charts). This is an operation which has often been done on the installation itself, at night, but can now be done at this earlier stage and in the design office.

The procedure is, briefly, to transfer the area, as seen from the top of each tower in turn, to the spherical chart.

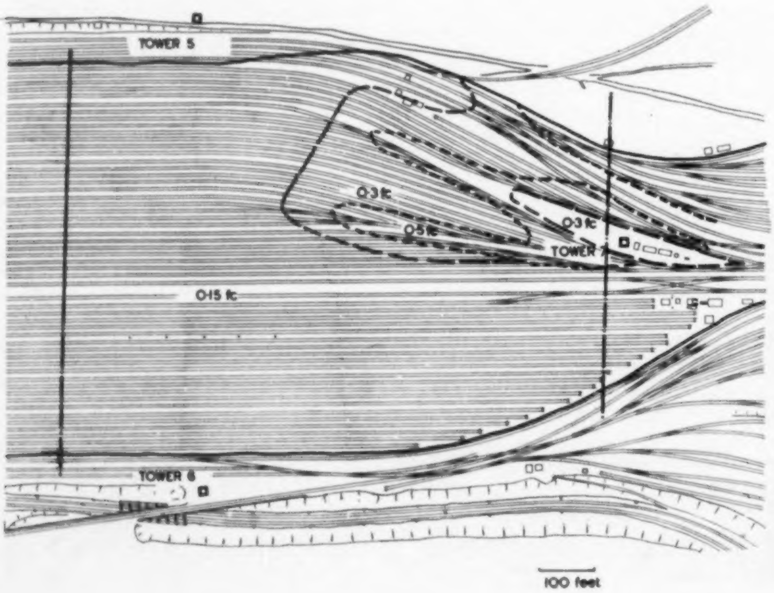


Fig. 4 (left). Plan of Area 5 showing specified minimum illumination over the various zones.

Fig. 5 (below). Appearance of Area 5 when plotted on to the Spherical Chart, showing the areas of high and low illumination together with the proposed aim directions of the floodlights on Tower 7.

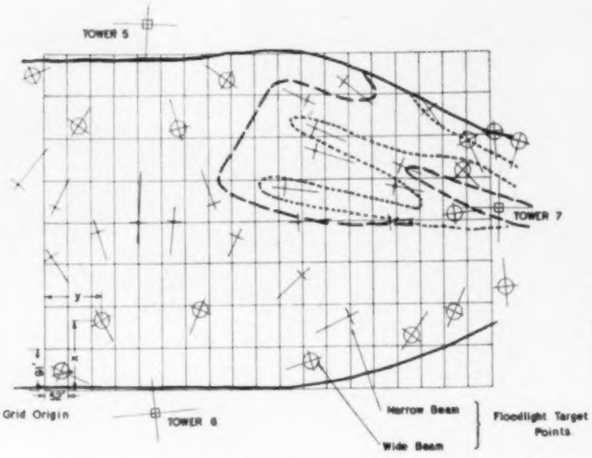


Fig 6 (above). For purpose of checking illumination from the proposed installation, using a digital computer to carry out point by point calculations, a grid is constructed to cover the whole area. The computer calculates the illumination at the centre of each grid element from the combination of floodlights on towers 5, 6 and 7.

COMPUTER DATA SHEET

D
N
L3/L4 Data
Programmes L3 and L4. Illumination of floodlit area, and aiming angles list.

Input by I.O.

CREWE AREA 5 REVISED — Title of area
JFP/LESTER — Initials
Blank tape — Charging number
T31.0 — YES — Aiming list required?

GRID DATA

Section width 91 ft.x 10^{-4}	Section depth 52 ft.x 10^{-4}	No.of rows (down)	No.of pages of 8 cols.(across)
·0091	·0052	13	1

J2.0

LANTERN LIST (Zero at top LH corner of area)

Input by R116 (modified)

Aiming point x	Aiming point y	Mounting Height	Code No. for distr.	Cut off factors 10^4Tan β	Cut off factors 10^4Tan γ	Mounting point x	Mounting point y
415	0	150	332	0	0	793	0
435	130	→					
332	282	→					
415	365	→					
462	436	→					
108	795	150	386	→			
376	886	→					
154	886	→					
539	1020	→					
*							

(1) Continue on separate sheets, as necessary, and end with an asterisk on a separate line.
(2) All numbers on the lantern table must be integers, and positive signs may be omitted.
(3) An arrowhead may be used to indicate that the remainder of a line is unchanged from the line above.

Fig. 7 (right). Data on the grid and floodlighting installation are sent to the computer office in this way. Each lantern is specified in one line of the lantern list.

Fig. 5 shows Area 5 as seen from the top of tower 7, together with an indication of the areas of high and low illumination. The total intensity required at various angles to the downward vertical, for each specified level of illumination, is pencilled on the chart and a preliminary arrangement of floodlights is built up. Points where illumination might be low are picked out by inspection and the illumination at each is checked by measuring the angle from the point to each adjacent floodlight axis and reading off the intensity contributed from the appropriate polar curve. Adjustments are then made as necessary until the designer is satisfied.

Great responsibility rests with the designer and he is usually pressed for time. Particularly where areas receive illumination from two or more towers, he could continue adjustments for a long time. It is desirable that he should be able to obtain an independent check. A computer programme has been prepared which enables the illumination to be calculated arithmetically for as many points as required.

Digital Computer Check on Planning

Tables of light distribution of all the types of floodlight used are read into the computer at high speed by punched tape: it follows the tape which gives the computer its programme. The programme allocates a position in the computer store for each of a rectangular array of points which can be chosen to cover the area to be lit as closely as considered necessary.

Fig. 7 shows the data sheet sent to the computer office and Fig. 8 the punching of the data tape which is read into the computer after the programme tape. The boxed areas on the data sheet are transferred to the punched tape and include the identification which is printed out at the head of the result sheet.

Fig. 9 shows the tape being fed into the computer. It takes in the programme and grid dimensions rapidly and then goes down the Lantern List, one at a time, reading the co-ordinates of the point at which each lantern is aimed, a reference to the appropriate light distribution table mounting height and finally the co-ordinates of the

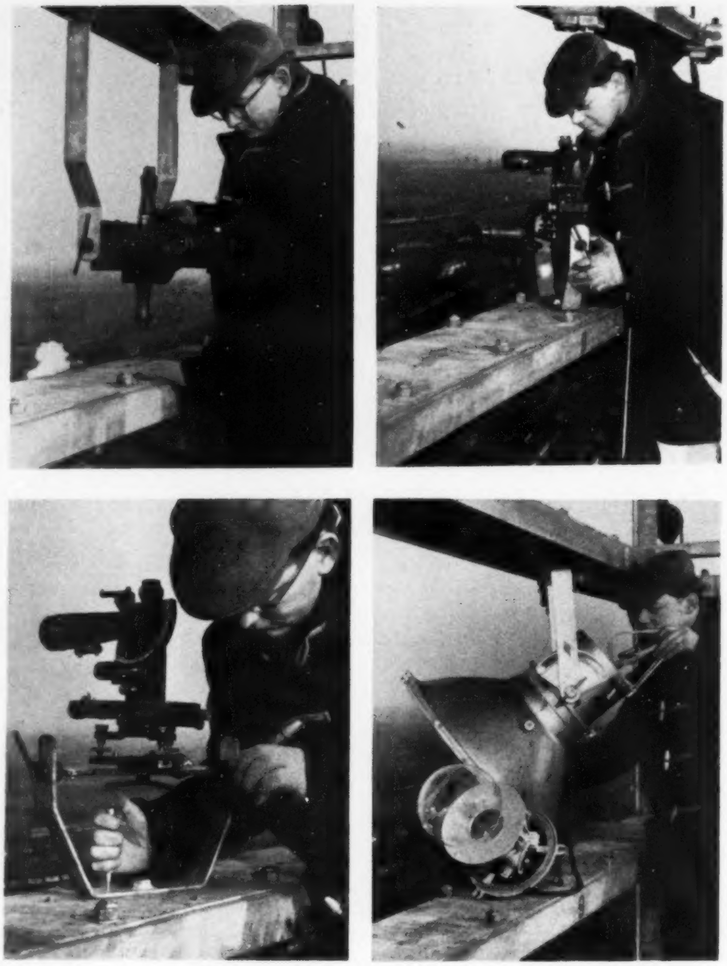
Fig. 8. A data input tape is punched at the computer office, the data being printed in figures for checking at the same time as it is punched on the tape.

Fig. 9 (right). The Pegasus computer at Rugby showing the data and programme tapes being "read in." When calculations are complete results are punched on to a second tape which is transcribed by the teleprinter at right.

12. 1. 59 -- 15
L3/L4 DATA
CREWE AREA 5
J?P/B4 LESTER

0.46	0.41	0.64	0.59	0.59	0.96	0.51	0.47
0.54	0.27	0.66	0.45	0.56	0.80	0.39	0.41
0.47	0.36	0.56	0.54	0.37	0.53	0.39	0.61
0.55	0.36	0.58	0.65	0.55	0.36	0.34	0.66
0.58	0.33	0.37	0.58	0.67	0.41	0.39	0.65
0.50	0.34	0.52	0.57	0.43	0.44	0.46	0.55
0.49	0.27	0.30	0.43	0.64	0.82	0.35	0.41
0.29	0.21	0.71	0.62	0.50	0.28	0.21	0.26
0.57	0.32	0.45	0.69	0.64	0.38	0.35	0.47
0.28	0.45	0.52	0.47	0.52	0.48	0.48	0.77
0.23	0.36	0.45	0.39	0.49	0.56	0.78	0.70
0.19	0.48	0.37	0.48	0.57	0.66	0.76	0.54
0.18	0.37	0.28	0.54	0.77	0.93	0.73	0.41
0.16	0.31	0.29	0.71	0.68	1.06	1.00	0.41
0.10	0.27	0.29	0.84	0.84	1.73	0.91	0.36
0.10	0.23	0.34	0.54	1.17	1.86	0.65	0.54
0.10	0.19	0.31	0.43	0.80	1.83	1.34	0.38
0.10	0.22	0.44	0.67	1.05	1.63	1.39	0.18
0.09	0.22	0.51	0.91	1.53	1.48	0.60	0.18

Fig. 10 (above). This is how the results are printed. The arrangement of the values in the table corresponds with that of the grid units to which they refer.



A | B
C | D

plan position of the floodlight. The latter only changes from tower to tower when mounting height is large compared with spacing of floodlights and it will be observed that an arrow symbol is used to indicate data unchanged from previous lantern.

The calculation routine is quite lengthy and the computer used takes nearly half-a-second to calculate the illumination at each point from each lantern. The angle between the direction of the point and the direction of aim of the floodlight is calculated: if this is less than 60 deg. it is considered that the contribution from that floodlight is significant and the intensity from the floodlight determined by interpolation in the light distribution table. The resultant illumination contribution is calculated and added into the appropriate computer store position. The asterisk at the bottom of the Lantern List indicates that the calculation is complete ; the computer then prints out the illumination values in tabular form corresponding to the arrangement of the points, as shown in Fig. 10. This list is transferred to the grid on the

Fig. 11 (above). Aiming of floodlights.

A. At the start the director bearing (or azimuth) scale is lined up with the master stirrup by means of a spirit level which has been added to the director.

B. The master stirrup is turned to bring the director telescope on to the aiming point : it is then correctly oriented. An inverted master stirrup is used for convenience in drilling the lower tier.

C. Marking the position of the locating hole through a small hole in the master stirrup.

D. After erection of the floodlight the clinometer is being inserted through the back. When the floodlight has been adjusted in the vertical plane the wing of the J-bolt is tightened on the quadrant and the flat of the hexagon bolt head adjusted to lie along the edge of the stirrup. The circular focusing screen can be seen on the side of the parabolic section of the reflector.

Fig. 12. Night view of part of installation.

installation plan to compare calculated illumination with specified illumination.

The programme has facilities not used in this case for taking into account the fitting of either vertical or horizontal louvres on any of the lanterns and will calculate and print out illumination on any specified vertical planes parallel with either edge of the grid. An additional facility used was the printing of an aiming list—azimuth angles with respect to the length of the grid and vertical angles with respect to the downward vertical. This is a useful over-all check on intermediate stages in preparing the lantern list.

Erecting and Aiming the Floodlights

Because of the difficulties and dangers of walking about the tracks it was necessary for the lighting engineers to find an improved way of aiming floodlights and it was decided to use artillery methods and equipment.

Originally it was thought that the gunsight or director could be mounted on the back of the projector after erection so that the projector could be aimed and bolted in position. Further consideration and discussion led to the adoption of a more streamlined method whereby the director was fixed on a " master stirrup " which was mounted at each floodlight position in turn and orientated as specified in the aiming schedule by means of a remote aiming point. In place of the locating-bolt hole the master stirrup had a smaller hole through which an automatic centre punch was used to mark the position of the locating-bolt hole. The contractors subsequently drilled the locating holes and hauled up the floodlights complete in their stirrup, mounting them in the required positions and plugging them to their respective electric power sockets. It was found more convenient to drill for the lower tier of floodlights from above and the upper tier from below: the marking out was done accordingly using an upright master stirrup for the lower tier of floodlights.

A second visit was needed to aim in the vertical plane and to lamp and focus the floodlights. The Field Clinometer can be used on a mounting plate at the back of the floodlight but it proved more convenient to place it on the inside of the front glass. Having aimed the floodlight the elevation back stop was lined up with a flat in contact with the stirrup edge and held there by a small jig while tightened. A check was made on its setting before locking the projector in its position. Finally the lamps were fitted and adjusted to correct focus.

Conclusion

The methods described saved a great deal of time and effort and moreover enabled the installation to go straight into service without further adjustment. Illumination measurements and performance have fully justified confidence in the methods.

The work was carried out to the requirements of British Railways engineers by Messrs. James Kilpatrick and Son Ltd., who were the main contractors.

We wish to acknowledge the work of Mrs. J. G. Roberts who did the computer programme under the guidance of Mr. E. A. Allwright of the Engineering Division of the B.T.H. Co. Ltd., Rugby.

Columbia Theatre, London, W.1.

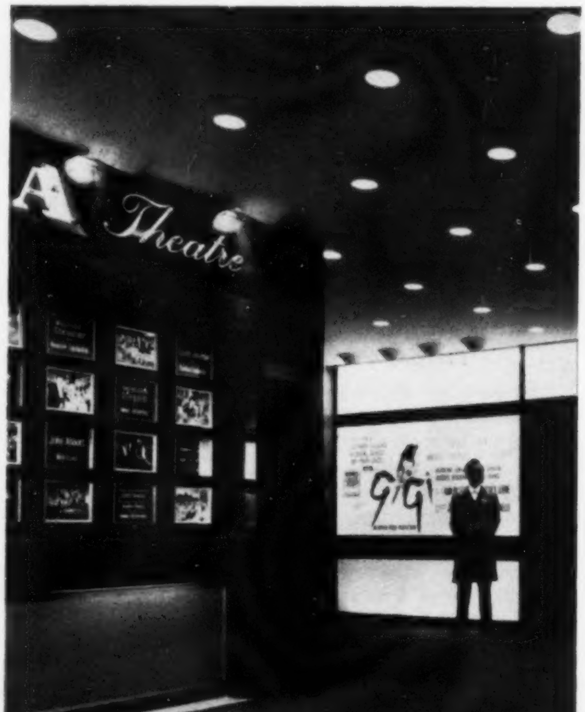
Architects, Sir John Burnet, Tait & Partners

THE Columbia Theatre (Columbia Pictures' new luxury cinema in Shaftesbury Avenue) is the first West End cinema to be opened in twenty years. It occupies part of the ground floor and basement of a new office block leased to the Egg Marketing Board, with the lowest part of its auditorium floor 25 ft. below street level.

The potential seating capacity of 800 was reduced to approximately 750 for greater comfort and the cinema is equipped with the most modern equipment for films of various dimensions, including Todd AO.

Entrances are from Frith Street and Shaftesbury Avenue, the latter frontage consisting of two 17-ft. long glass and stainless steel sliding doors which disappear into the thickness of the wall, leaving an unobstructed opening of 23 ft. to the entrance and main booking hall. Outside the doors are columns faced with black granite, an illuminated canopy with laylights of Georgian wired glass, and an illuminated fascia of black stove-enamelled steel, with opal glass lettering.

The rear wall of the entrance hall is partly covered



Right, part of entrance and main booking hall. Rear wall of opal-glass conceals fluorescent lamps. Ceiling recesses house tungsten lamps shining on to displays. Top, canopy with laylights of Georgian wired glass concealing banks of fluorescent lamps and troughs housing rows of floodlamps providing blaze of light around the entrance. Interchangable letters are of stove-enamelled steel and red and white opal glass.

by a large photomural and by an internally illuminated display unit for colour transparencies in a frame of natural and ebonised hardwood, black anodised aluminium and bronze. Turning right, one is faced by a wall predominantly of flashed opal glass, lit from behind by fluorescent lamps and pierced by the two ticket office windows. The lamps are below counter level and above eye level to prevent glare.

Additional display panels lead to the head of the stairs where a wall of red plastic sheeting includes a door giving access to the covered car park at the rear. The stairs descend to the mezzanine foyer, approximately 40-ft. square, with its ample seating accommodation, cloakroom, lavatories, auxiliary ticket office, sweet shop and telephone kiosk. Finishes at this level are: matt white walls, with ebonised hardwood dado rails, natural hardwood skirting, and piers of black anodised aluminium and red and blue plastic sheeting.

A glass and bronze balustrade surrounds a large staircase well, and the stairs descend to the small basement foyer, with the adjacent retiring room for royalty. This foyer has a matt black ceiling and walls painted dove grey and cantaloupe. Doors of white plastic, with gold anodised " rules," lead to the egg-shaped auditorium.

The upper part of the rear wall of the auditorium projects over the rear seats to provide accommodation for the projection equipment. It merges tangentially with the lower part of the wall at a point close to the proscenium opening. Both walls and ceiling are of fibrous plaster, the former grooved to improve the acoustics, the latter pierced by a random arrangement of openings for lamps and ventilation outlets.

Echoing the pattern formed by the grooves in the fibrous plaster walls are the pivoted vanes of the inlet ventilators and the " effects " loudspeakers. The proscenium opening contains a stage, with inner and outer curtains of glass-fibre fabric, respectively light grey and white, and illuminated by concealed head- and foot-lights.

The main lighting of the auditorium, including the maintained lighting and the cleaners' lights, comes from tungsten lamps recessed into the ceiling. Spotlights shine on to the white columns and concealed lamps around the periphery light the side and rear walls.

The basement foyer is lit by tungsten lamps concealed by a pelmet along two walls, while the retiring room has a similar treatment, together with three cylindrical brass wall-lights designed by the architects.

The main (mezzanine) foyer is lit by cold-cathode tubing, concealed by the continuous hardwood pelmets

Below, basement auditorium with general, maintained and cleaners' lights recessed into the fibrous plaster " lunar landscape " ceiling. Other, larger, recesses are ventilation outlets. Adjustable spotlights light the columns, while the lower parts of the side walls are lit by concealed tungsten lamps. The curtain is lit by head- and foot-lights.

Top, main (mezzanine) foyer. A peripheral hardwood pelmet conceals cold-cathode tubing. "Plyglass" laylights in the lower ceiling area conceal fluorescent lamps; along the edge of this ceiling special fittings with stove enamelled reflectors direct light on to the remainder of the ceiling. Above, basement foyer lit solely by tungsten lamps concealed by hardwood pelmets. (Basement lighting is on dimmer circuits.) Right, retiring room with pelmet lighting supplemented by the architect-designed wall-lights in the form of spun-brass cylinders.

and throwing most of its light on to the walls. A change in ceiling level provides an opportunity for a row of fittings (with black enamelled battens concealing fluorescent lamps) that light the main area of ceiling. The lower area includes a row of "Plyglass" laylights that conceal more fluorescent lamps. Finally, recesses in the fibrous plaster house tungsten lamps that shine on to the piers of the staircase well.

In the ground floor entrance and booking hall, in addition to the light from the wall of flashed opal glass, there is indirect lighting from cold-cathode tubing, concealed in a trough along the two outer edges of the suspended ceiling. Maintained lighting, as throughout, is from downlights recessed into the ceiling, while spilt light comes from the illuminated displays and from flood lamps in the ceiling that shine on to these displays.

External lighting comprises banks of fluorescent lamps concealed by the laylights of the canopy; illuminated fascia lettering, with interchangeable stencil letters of red and white opal glass; and rows of spotlights housed in an inverted trough in the soffit of the canopy to provide a blaze of light about the entrances. Finally, there is indirect lighting to the soffit of the Frith Street entrance from lamps concealed in the trough-shaped transome of the entrance doors.

There are, incidentally, no "off the peg" decorative fittings in any of the public areas. Almost all the lighting is built-in or concealed and the only "fittings," as such, are those in the retiring room.

The main contractor for the building was Trollope & Colls Ltd.; the cinema interior was carried out by H. H. Martyn & Co., of Cheltenham; and the lighting installation and the supply of lighting fittings was the responsibility of Troughton & Young Ltd.

Part of the main demonstration area

The British Lighting Council

A brief account of its objects illustrated with views of the recently opened demonstration centre in London (architect, Hulme Chadwick).

EARLY in 1957 when the dissolution of ELMA was imminent, there was a distinct possibility that the promotional work carried out for the previous thirty-three years by the Lighting Service Bureau at 2, Savoy Hill would come to an end. In fact the opposite has occurred, and work similar to that of the former LSB is now carried out on a much broader basis by the British Lighting Council from its new headquarters at 16/18, Lancaster Place, London, W.C.2.

Whereas the LSB was run by lamp manufacturers only, the BLC is supported equally by lamp manufacturers represented by ELIC, Electricity Boards represented by EDA, and (so far) thirty-five fittings manufacturers represented by the Lighting Equipment Development Council, a body of manufacturers of fittings and associated gear formed specifically to support BLC and including some firms not members of ELFA. By far the greater part of the lighting industry, therefore, already has a direct interest in the success of BLC whose constitution does not preclude other interested bodies from joining. The wide support BLC receives is, of course, only logical, for any improvement of lighting anywhere is of benefit not to one section of the lighting industry only, but to all.

The declared aim of BLC is "to promote the full and proper use of electric lighting in the service of the community." But more simply, it is to give anyone concerned with supplying or using lighting—that means everybody—better ideas and bigger ideas than they at present have. It steers very clear of producing anything in the nature of a detailed specification for any individual lighting job (for this is the province of the Illuminating Engineering Department of one or other of its supporting members), but uses its influence in the pre-specification stage advocating sufficient light of proper quality for the purpose, backing up its general recommendations with sound arguments for their adoption. In short it tells people the kind of lighting

Above, another part of the main demonstration area. Right, the entrance in Lancaster Place.

Above, part of the domestic section.

Below, the conference room in which a number of alternative lighting systems can be demonstrated.

they should aim for, and thereafter it is to the people concerned to see that they get it—or to the lighting industry to sell it.

The recent opening of the new London headquarters has naturally attracted a great deal of attention, but the provincial activities are, in fact, at least as important. The regional offices in Glasgow, Leeds, Manchester, Birmingham, and Newcastle have been operating for a number of years, their respective areas being related to those of the local electricity boards. A new office is now being set up in Bristol, and regional engineers are being appointed to cover the areas of the four Boards in the south-east. The regional engineers are assisted by local committees with equal representation from the three founder organisations, and provided they follow the programme of activities laid down by the Council, they are free to develop lighting by any means they think fit, with help where necessary from the central staff in London.

As a rule a promotional organisation makes its greatest impact if from time to time it concentrates the major part of its effort in one direction only. It would, however, be impracticable for the BLC to operate in such a way. For one thing it would not be wise to suddenly drop interests it has successfully nursed for many years past; for another, some of its supporting members interested only in lighting fittings might be quite unconcerned with supplying equipment suitable for the chosen field of campaign. This year the emphasis of BLC operations has been on shop lighting and is likely to continue so for another year, but all the other fields of lighting are receiving their due share of attention at the same time.

Courses of lectures on lighting are to be continued. This year it is hoped to hold, in the areas of each of the electricity boards, courses for the staffs of BLC members, for the retail trade, for industrial and commercial users, and for architects—fifty courses in the provinces alone, in addition to the usual 300 or so separate lectures to Chambers of Trade and other organised groups. It is indeed a formidable programme, and to carry it through the BLC has at present only a small staff to influence a very large number of people; in addition use is made of expert speakers on the staffs of member firms, but there are never enough volunteers with a thorough knowledge of what they want to say and the ability to say it.

Safety Lighting

By G. W. LEVEY

Some notes on the provision and operation of safety lighting systems in buildings.

Conditions in many buildings are unsafe if the lighting fails without warning. The normal lighting installation should be as reliable as it is possible to make it and, if the risks warrant the additional cost, a secondary system should be provided to allow safe evacuation of the premises, the restoration of the main supply or the uninterrupted use of the building.

The term "safety" has been introduced into Statutory Regulations and, therefore, supersedes the more general terms of "emergency" or "secondary" when lighting is required for the sole purpose of ensuring the safe exit of persons without the aid of general lighting. When the main risk is the loss of production or damage to plant, as distinct from personnel, the older terms are more appropriate.

Safety lighting is a statutory requirement where the failure of the general lighting would plunge a crowded building into darkness and the Senior Electrical Inspector in his Memorandum on the Electricity Regulations recommends an alternative means of lighting in electrical stations to allow of safe access to plant for the purpose of restoring the supply.

Many large stores install secondary lighting to prevent the possibility of panic or pilfering during a blackout and such a system is necessary in hospitals, particularly in operating theatres. It is sometimes considered desirable to provide a system in business premises or works when the loss caused by a blackout would warrant the cost of providing and maintaining a secondary system.

Statutory obligations are well defined, the question of whether to guard against a blackout in other circumstances must be influenced by the risks to people or the loss likely to be incurred.

Gas and oil lamps, although sometimes used, are not dealt with in this article as electric lamps are usually a more convenient light source. The particular problems and the design of installations in cinemas were dealt with by Winslade in the March, 1957, issue of *Light and Lighting*.

Electricity Supply

Public electricity systems are now so interconnected that it is almost impossible to find two independent systems in the same district and, even if suitable alternative supplies were available, the cost of providing a second service would be prohibitive except for the larger installations.

The reliability of the modern storage battery makes it a suitable source of supply for the smaller loads; it can be charged automatically by rectifiers thus avoiding the use of rotating machines which require careful attention and maintenance.

When secondary lighting is required as an aid to the uninterrupted operation of plant it is also necessary to provide energy for the machines and the heavier loads usually warrant the installation of generating plant, which can be arranged for either manual or automatic starting depending on the time which can be allowed for the restoration of the supply.

When burnable surplus by-products are available or other conditions make it economical, generators are arranged to run continuously in parallel with the public supply and, if suitable controls are provided, afford a reliable secondary service for both lighting and power. The controls should be arranged on failure of supply to separate the generators and their essential loads from the faulty supply and any non-essential loads. Such a system is customary in iron and steel works, but the cost of distribution to outlying buildings is so high that it is usually more economical to provide local battery installations.

The Installation

A safety lighting installation must be an entirely separate system with all cables and equipment placed and installed so that they cannot possibly be affected by a failure of the main supply.

The most likely causes of failure of both systems simultaneously would be explosion and/or fire and to avoid this risk the wiring of the secondary system should be kept as far away as possible from other electrical services and the battery or generator and control equipment should be segregated in fireproof enclosures. The fire-resisting property of mineral insulated cables make them particularly suitable for the secondary circuits.

It is not always necessary to adopt the same voltage as applied to the main lighting system; the danger of interchanging lamps on the two systems can usually be overcome by varying the lamp caps. The most economical voltage can only be decided by considering the relevant factors for the particular job. In the smaller battery systems, the cost of the battery for a given output would increase with the voltage, but this would be compensated by the use of smaller cables and switchgear.

When the cost of a secondary system is prohibitive much can be done to increase the reliability of the lighting by designing the distribution network with alternative feeds so that nothing short of an extensive failure would cause a prolonged blackout.

Battery Systems

To avoid unnecessary capital and maintenance costs it is desirable to keep the capacity and voltage of the battery as small as possible and to limit the amount of work it has to do, providing always that the risks are adequately covered.

Standard equipments complete with control gear are available to suit the smaller installations ; the choice of system must, however, be governed by statutory and other regulations where these apply and elsewhere by the conditions and economics of the particular job.

If the battery is to be used on a charge and discharge cycle, it must be large enough to carry the load for the period specified and this period must leave sufficient time for recharging when the light is not required. The system cannot, therefore, be used when the lighting is required for long periods for instance in some installations it is required 24 hours per day.

Alternatively the battery can be connected to float across the DC supply and the load, the input being regulated, as far as practicable, to provide a constant voltage across the lamps without appreciably charging or discharging the battery, which is discharged only on a failure of the main supply. This system has the advantage that the battery can be smaller and it is not subject to the same wear and tear as one which is being continually discharged and recharged. The success of the floating battery depends on regulating the supply to keep it fully charged and this needs constant attention and can only be avoided (if the use of change-over contactors is not prohibited) by keeping the battery in good condition with a trickle charge and discharging it only in an emergency. Change-over contactors enable the lighting to be normally connected to the main supply.

Batteries installed for other purposes, e.g. switchgear closing, sometimes have sufficient spare capacity to feed secondary lighting. Tripping batteries should not, however, be used for this purpose because their proper function is much too important to be jeopardised by faults on or the mal-operation of extraneous circuits.

Methods of Operation

The method of operation for certain installations must comply with specific regulations ; in others it is only necessary to provide facilities to suit the particular risks involved. Broadly one of three methods can be adopted:—

(a) Feed the safety lighting from the alternative source whether the general lighting is available or not.

(b) Feed the safety lighting from the main supply during normal conditions and change over to the alternative supply automatically on failure of the main supply.

(c) Switch on the safety lighting only on a failure of the main supply either manually or automatically.

System (a) has the advantages that any fault such as a blown fuse or faulty lamp is readily detected and there is no risk, however small, of a change-over contactor failing to operate at the crucial moment. These features make the method particularly reliable and for this reason it is used extensively for the protection of public audiences.

With system (b) faults other than those of the change-over device are readily detected and as the battery is not normally in use it has a longer life being trickle charged as previously described.

System (c) is only suitable where the entire installation is tested frequently and the failure of one lamp is not likely to be serious. It is useful in such situations as unattended sub-stations where the secondary lighting can be part of the complete system and switched in the same way.

Safe General Lighting

Under the Factories Act, 1937 (Part 1, Section 5) " Effective provision shall be made for securing and maintaining sufficient and suitable lighting whether natural or artificial in every part of a factory in which persons are working or passing." This does not stipulate a secondary system, but it does point to the need of security of supplies to the general lighting, which can be afforded by arranging alternative supplies and interlacing the final sub-circuits.

The Senior Electrical Inspector of Factories in his Memorandum on Electricity Regulation No. 26 says " lighting circuits generally should as far as possible be kept separate from the power circuits so that in the event of failure of the power supply light is still available." This line of thought is all right if the lighting over a particular machine does not depend on one lamp or one circuit and the supply to the area is maintained, otherwise there seems to be some merit in having both power and lighting on the same supply so that if the light fails the machine stops.

The problem is to some extent tied to the facility to stop machines safely in darkness, which suggests luminous push buttons suitably placed.

Maintenance

The effectiveness of secondary lighting depends on it being ready for an emergency, so that unless the installation is given careful attention when the light is not essential it is liable to be found " wanting " with disastrous results when the emergency does arise.

A planned cleaning and maintenance programme, so essential with general lighting, is imperative with the secondary system, particularly as faults on the installation may remain unnoticed because they do not cause inconvenience until the main supply fails.

Personal

After serving for nineteen years in the Engineering Dept. of the Ministry of Works, MR. W. E. RAWSON-BOTTOM, F.I.E.S., has retired from the post of Illumination Engineer. Mr. Rawson-Bottom can proudly claim fifty years of active association with the lighting industry which period includes the unique experience of participation in three Coronations. During his service with the Ministry he was largely responsible for the many post-war lighting improvements introduced into national museums and art galleries. He also played a great part in special lighting features such as those for the Victory Celebrations. He has presented a number of papers on museum and art gallery lighting to the Museums Association, the CIE and the IES and has served on the NIC and various BSI committees. He proposes to continue professional activity in a private consultative capacity. He will be succeeded at the Ministry of Works by Mr. J. B. Harris.

Erratum

On page 120 of the April issue it was stated that fitting No. 1 shown on that page was made by Lyfa of Copenhagen. The fitting is made by Elektroluma Ltd., Copenhagen, to whom we would apologise for our error.

The main entrance hall.

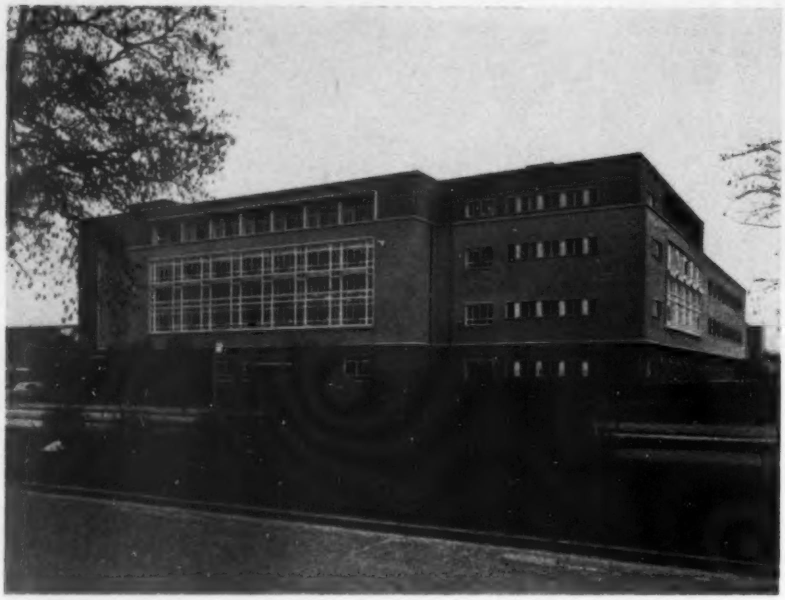
Lighting Company Headquarters at Leicester

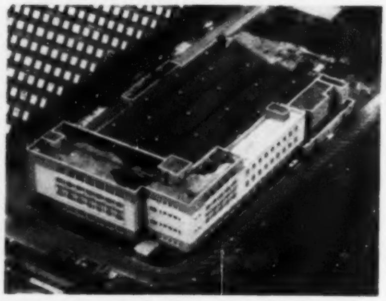
THE recently completed headquarters building for the A.E.I. Lamp & Lighting Company at Melton Road, Leicester, comprises a single storey north light factory area of 36,000 sq. ft. enclosed on its south and west sides by an L-shaped office block rising to four storeys with a floor area of 68,500 sq. ft. In addition to the headquarters offices, the building houses research and development laboratories and a large area where pre-production work is carried out.

In lighting the building the opportunity has been taken to make use of it in an experimental way, to try out new ideas and new equipment, to obtain complete information on maintenance of different types of equipment and installations, as well as to demonstrate established techniques and standard products. The building was in fact designed with these objects in mind. Discussions with the architect and the consultants for heating and colour took place early in the design stage so that the company's lighting engineers could make known their requirements. A basic ceiling layout was adopted which gave immediate flexibility for design and facilitated additions or alterations to the lighting when required.

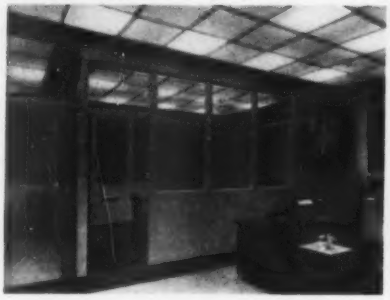
The decision to heat the building by low pressure hot water coils placed horizontally above metal ceilings directly affected the lighting design since it meant that in general the ceiling had to be free of large areas of material which would act as a barrier to radiant heat. This ruled out the usual form of luminous ceiling and limited the use of recessed lighting. All lighting equipment placed in close proximity to the ceiling had to be designed to withstand temperatures associated with radiant heating panels and any reduction in lamp efficiency due to overheating of lamps had to be taken into account.

The office block was planned in 12 ft. bays with suspended ceilings based on a 2 ft. by 1 ft. panel. Two rows of lighting trunking 6 ft. apart are installed down each





Exterior and aerial views of the building.



Left, general office area in the executive suite in which the effect of a luminous ceiling is produced. In the office on the right semi-recessed module lighting units are used.

The boardroom lit from a special framework above the table and by louvred peripheral lighting.

A general view of part of the Lighting Application Development Laboratory.

30 ft. length of bay at right angles to the windows. A 2 ft. wide strip in the centre of each bay is left free of heating coils where recessed lighting equipment can be used. With this basic trunking installation it has been possible to use many different kinds of lighting equipment and techniques, standard and experimental, in various parts of the building. For example, on part of the first and second floors an attempt has been made to combine in one ceiling the total requirements of heating, lighting and sound control ; the use of deep baffles enables relatively high levels of illumination to be used without glare and with the minimum restriction to the radiation of heat from the ceiling. A wide variety of other lighting treatments is used in other offices, in corridors and other circulation areas. The illustrations on these pages show some of the methods used.

The architect for the building was Mr. S. Penn Smith, F.R.I.B.A., Mr. Derek Phillips, A.R.I.B.A., who was formerly staff architect to the A.E.I. Lamp & Lighting Co. Ltd., was responsible for the lighting of the building. The main contractor was George Wimpey & Co. Ltd.

NEW PRODUCTS

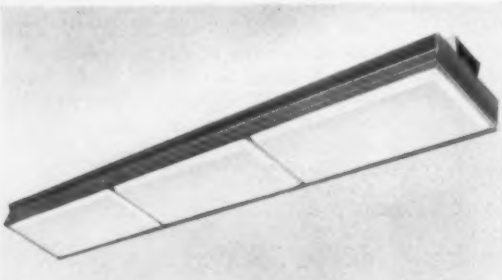
Crompton's "Pacemaker" fluorescent fittings

This range of fluorescent fittings was introduced to provide inexpensive industrial and commercial fittings of attractive appearance and modern production and design methods enable the "Pacemaker" range to be offered at competitive prices. The basic element consists of one-lamp or two-lamp strips for either 4 ft. or 5 ft. bi-pin cap tubes. Fixing is by means of a pressed steel plate with provision for fixing to a ceiling under/or pendant from tube or chain at various centres. The channel containing an enclosed tapped choke and a PF capacitor is hung on one side of the plate for wiring and then firmly screwed into the working position. For industrial applications, an enamelled rust-proofed steel open top reflector can be added to both the 4 ft. and 5 ft. basic fittings.

The commercial fittings take two main forms, with three diffusing elements for either, all of which are low in price. The first comprises a white enamelled frame with tapered sides, the second having a frame with diabolo shaped sides. White opal plastic dishes, crystal patterned glass, or plastic louvres are supplied with the frames as complete assemblies, and with the necessary attachments for making any one of the "Pacemaker" strips into the appropriate commercial fitting.

List prices for the basic battens complete with high power-factor gear, range from £3 16s. for a one-lamp 40-watt fitting and £4 6s. for a one-lamp 80-watt fitting to £7 2s. for a two-lamp 40-watt and £7 16s. for a two-lamp 80-watt fitting. The 4 ft. open top reflectors add 22s. each list to the above and the 5 ft. reflectors 30s.

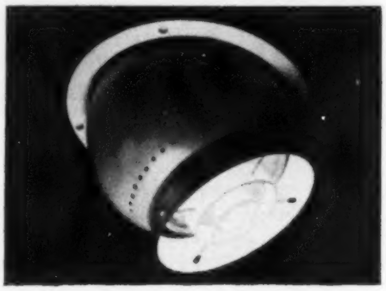
Crompton Parkinson Ltd., Crompton House, Aldwych, London, W.C.2.



Crompton diabolo type framed fitting in the "Pacemaker" range.

Display spotlight

A feature of the Harris & Sheldon "Kendal" spotlight is that it needs only 2¼ in. headroom when recessed



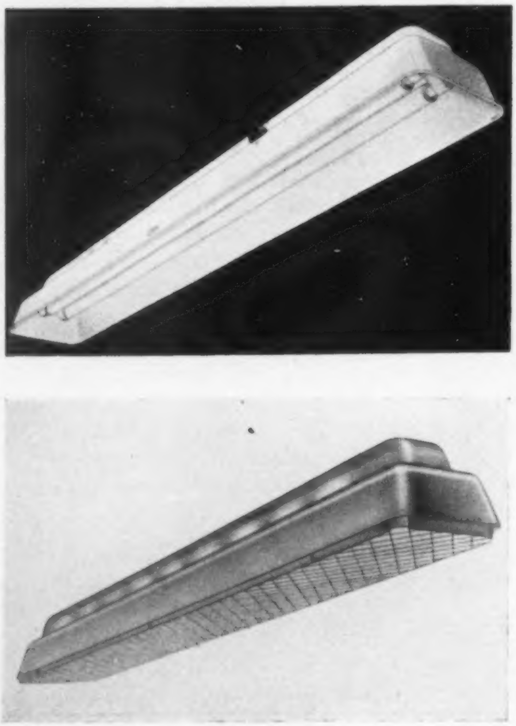
into a ceiling. Of the eye-ball swivelling type, it can be tilted to within 30 degs. of the horizontal. It is designed for use with the Philips hard glass 150-watt reflector lamp but may be used with 100- or 75-watt reflector lamps or the normal 150-watt reflector lamp if the louvre is omitted.

Harris & Sheldon (Electrical) Ltd., Ryder Street, Birmingham, 4.

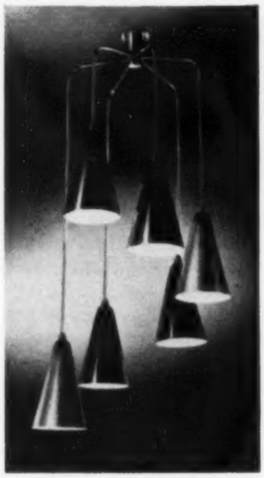
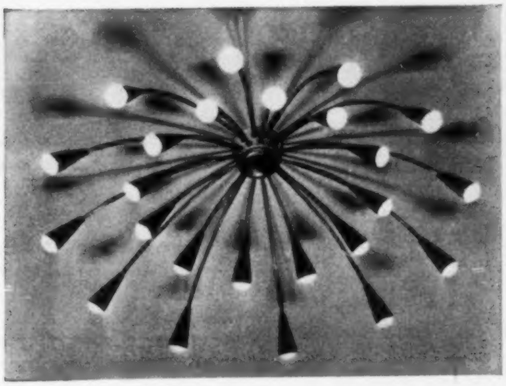
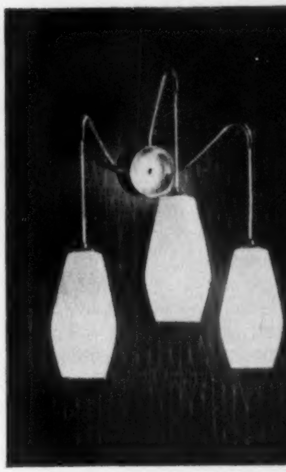
Benjamin "Taskmaster" fluorescent range

In the Benjamin "Taskmaster" range of fluorescent fittings attention has been given to appearance design and efficiency of production. The range is designed to meet a very high proportion of industrial and commercial requirements and is suitable for 4 ft., 5 ft. and 8 ft. lamps. Though Benjamin claim improvements in design and quality for the fittings in this range, they have (by streamlining their manufacturing processes as well as the fittings) been able to reduce prices, in some cases by as much as 21 per cent. The fittings in this range can be used either individually or in conjunction with trunking. Reflectors are pressed in one piece with flowing curves at the ends. The gear channels are also pressed in one piece and styled to flow with the curves of the reflectors. Bi-pin lampholders are used with the 4 ft. and 5 ft. versions and RDC lampholders with the 8 ft. fittings. Reflectors are finished in "Crysteel" vitreous enamel or in "Peropal"; there is also a closed-end reflector in opal acrylic plastic for which a translucent opal egg-crate louvre is available.

Benjamin Electric Ltd., Tottenham, London, N.17.



Two of the Eenjamin "Taskmaster" fittings. Above, closed end metal reflector; below, louvred fitting.

Three examples from the AEI "Fiesta" range.

AEI "Fiesta" range

The AEI "Fiesta" range includes more than 50 decorative tungsten lamp fittings designed mainly for use in offices, public buildings, hotels, restaurants and shops. It includes ceiling pendants, wall brackets and table and floor standards which will blend with many period settings and are suitable for use in most modern surroundings. The examples illustrated above include (left) a six-light pendant in polished brass with red enamelled metal cones at varying heights; overall length 39 in., diameter 16 in.; price is £16 4s. plus P.T.; centre, a polished brass ceiling fitting with black lampholder covers with 24 40-watt 50 cm. round obscured lamps; overall length 11 in., diameter 48 in.; price £30 3s. plus P.T.; right, a three-light wall bracket using "Satina" glassware; price £11 1s. plus P.T.

A.E.I. Lamp and Lighting Co. Ltd., Melton Road, Leicester.

Atlas school fitting

A new acrylic shade fitting (below left) for use with either a 150- or 200-watt lamp, has been introduced by Atlas Lighting Ltd. Complying with Ministry of Education requirements for cut-off angles and brightness limits, the new fitting though designed primarily for school lighting is also suitable for use in offices, shops, small assembly halls and many other locations.

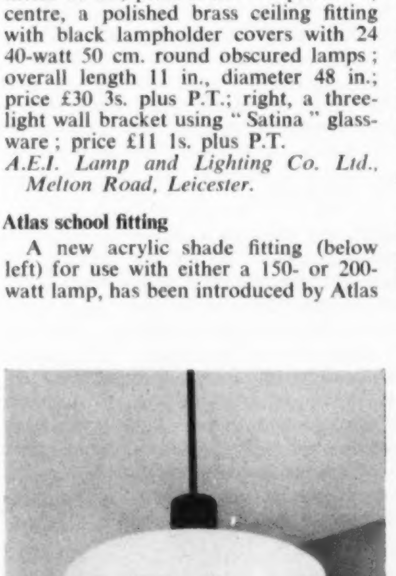
A metal gallery and spider, each finished matt black, enhance the appearance of the opal acrylic shade, and offer quick, easy maintenance. The shade is instantly removable for cleaning without disturbing the lamp, and alternative fixing positions are provided on the gallery for 150- and 200-watt lamps. The retail price of the shade complete with gallery and spider is £1 12s. plus 7s. purchase tax. Special rod, cable and close ceiling suspension sets for the fitting are available.

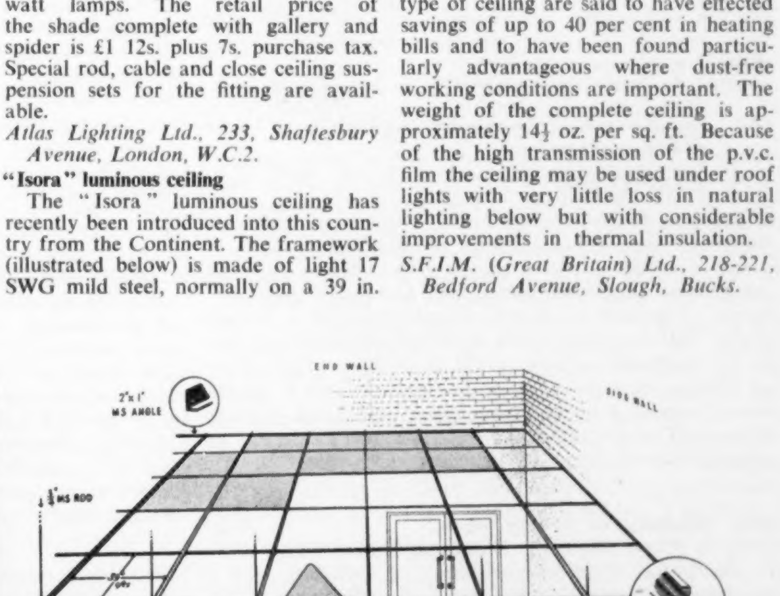
Atlas Lighting Ltd., 233, Shaftesbury Avenue, London, W.C.2.

"Isora" luminous ceiling

The "Isora" luminous ceiling has recently been introduced into this country from the Continent. The framework (illustrated below) is made of light 17 SWG mild steel, normally on a 39 in. grid, which can either be welded permanently into position or made to be dismountable. The panels consist of flexible p.v.c. stretched over a mild steel frame which fits into the framework. Light transmission of the p.v.c. is between 70 and 88 per cent depending on the colour and texture. The cost of the ceiling (less lamps and associated gear) is said to be about 6s. 6d. per sq. foot though it will naturally vary slightly according to the details of any particular installation. In addition to the advantages normally claimed for luminous ceilings, installations of this type of ceiling are said to have effected savings of up to 40 per cent in heating bills and to have been found particularly advantageous where dust-free working conditions are important. The weight of the complete ceiling is approximately 14½ oz. per sq. ft. Because of the high transmission of the p.v.c. film the ceiling may be used under roof lights with very little loss in natural lighting below but with considerable improvements in thermal insulation.

S.F.I.M. (Great Britain) Ltd., 218-221, Bedford Avenue, Slough, Bucks.





Lighting Abstracts

OPTICS AND PHOTOMETRY

681. Automated universal distribution photometer. 535.24

J. S. FRANKLIN, *Illum. Engng*, **53**, 667-675 (*Dec.*, 1958).

A fully automatic distribution photometer capable of handling any existing or foreseeable street light, floodlight or lamp, including searchlights, has been constructed using an inclined plane mirror, 8 ft. by 12 ft. around which the luminaire (up to 9 ft. in length) is rotated. Variations in the azimuth and elevation of the luminaire relative to the photocell light path are determined by a programme unit fed with appropriately punched cards. Similarly, the light and electrical measurements are fed into an analogue-to-digital converter and thence to further punched cards. The photometric data can also be presented on long-persistence cathode-ray oscilloscopes for visual examination or photographic recording. P. P.

535.24

682. Vertical distribution of light from gas-filled candlepower standards.

L. E. BARBROW and S. W. WILSON, *Illum. Engng*, **53**, 645-648 (*Dec.*, 1958).

Photometric measurements on gas-filled tungsten-filament lamps used as standards of luminous intensity showed that their candlepower varies by almost 10 per cent (500-watt lamps) through a range of tilt from the vertical of ± 5 degrees. The variation has been expressed as a cosine function having an amplitude of 5 per cent of maximum candlepower and a period of 18 degrees. Internal frosting of the lamp bulb, together with the use of medium bi-post rather than screw-cap bases (American practice), reduces the variation to less than 1 per cent. In spite of the larger effective source size, the inverse-square law can be used to an accuracy of within 1 per cent provided the operating distance is 50 cms or greater. P. P.

621.327 : 534.15

683. Measurements of the spectral distribution and colour of fluorescent lamps.

B. JAKEL-HARTENSTEIN, *Lichttechnik*, **11**, 20-22 (*Jan.*, 1959). *In German.*

Using a double monochromator and vacuum photocell, calibrated directly with a total radiator and checked by means of tungsten strip lamps, the authors have determined the spectral distribution curves of a number of fluorescent lamps. The lines are shown as rectangles with a breadth cluded that the mean error does not exceed 4 per cent in the continuum and 6 per cent in the lines. Five of the of 10 mμ. Sources of error are analysed and it is con- lamps were of German manufacture, five Dutch and one Russian. The chromaticity co-ordinates are also given. The colours included white, daylight and warm-white.

J. W. T. W.

684. Efficiency of flashing lights. 535.24

T. H. PROJECTOR, *Illum. Engng*, **53**, 600-604 (*Nov.*, 1958).

The overall or effective efficiency of a flashing light is considered to consist of two parts, the efficiency of conversion of electrical energy to luminous energy and the efficiency with which a given amount of luminous energy is used to produce an effective flash of light. The first part can be measured conventionally. The second part is designated the Blondel-Rey Merit Factor, based on the Blondel-Rey equation for the effective intensity of a flashing point source at the threshold of perception. Examples of the determination of effective efficiency are given for flashing incandescent and condenser-discharge lamps and for a rotating beacon. P. P.

612.843.367

685. Glare from isolated light sources in the field of view.

W. ARNDT, H. W. BODMANN and E. MUCK, *Lichttechnik*, **11**, 22-28 (*Jan.*, 1958). *In German.*

Another investigation of the glare produced by a rectangular source of light of uniform luminance (B) mounted on the wall facing an observer seated at a desk in an individual office. The effect of size and position of the source, its luminance and that of the background have been assessed by 240 observers and the results obtained for the most part confirm those found by Petherbridge and Hopkinson, by Luckiesh and Guth and by Vermeulen and de Boer. In the glare formula $G = B.\ \omega^m/P.B_u^n$ where B_u is the luminance of the background, ω is the angular size of the source and P is a position factor, the values found for m and n were respectively 0.34 and 0.64. Rounded values of 0.33 and 0.66 are recommended for use within the definite limits of the variables stated in the paper. J. W. T. W.

LAMPS AND FITTINGS

621.327.43

686. Design of fluorescent lamps for high frequency service.

G. A. MEYERS and F. M. W. STROJNY, *Illum. Engng*, **54**, 65-69 (*Jan.*, 1959).

Measurements have been made of the performance characteristics of fluorescent lamps operating from high-frequency power supplies. Increased lumen efficiency is obtained beyond a frequency of about 300 c/s. A power factor of almost unity is obtained with inductive ballasts beyond 400 c/s. Cathode losses are decreased, with a marked improvement between 60 and 400 c/s. Radio frequency interference is drastically reduced. The only adverse effect is an increase in lamp starting voltage, in one instance by as much as 25 per cent. P. P.

687. New combustible for photoflash lamps. 621.327.9

L. F. ANDERSON, *Illum. Engng*, **53**, 657-662 (*Dec.*, 1958).

After considering the performance characteristics of miniature photoflash lamps, reference is made to a series of new lamps in which the aluminium filament is replaced with one made of zirconium. The superior light output (equivalent to a whole stop in camera aperture size) enables higher shutter speeds or increased camera distances to be used. A blue filter coating on two of the lamps gives complete compensation to daylight colour temperature (6000°K). Smaller bulb sizes, together with a smaller diameter of the accompanying reflector, mean that camera flash equipment can now be made more portable. P. P.

621.327.4

688. Measurement of mercury lamp current crest factor and its effect on lumen maintenance.

E. C. MARTT and R. J. SMITH, *Illum. Engng*, **53**, 630-635 (*Dec.*, 1958).

The distortion of the current waveform in an inductive circuit can be measured by the crest factor, defined as the ratio of peak to R.M.S. lamp current. Its measurement by means of a magnetic oscillograph with graphical analysis

is described and compared with other techniques including one using a peak reading voltmeter and R.M.S. ammeter. The influence of crest factor on the lumen maintenance of mercury vapour lamps burning in a number of industrial and street-lighting luminaires has been determined, curves being obtained showing the higher lumen loss in lamps operating with crest factors greater than 1.5. P. P.

689. Calculation of illumination from line sources. 628.93
J. Roch, *Lichttechnik*, **10**, 613-615 (*Dec.*, 1958). *In German.*

The light distribution curve of a fluorescent fitting in any plane passing through the axis of the ..., is very nearly an ellipse, the ratio of whose axes (d) may be from 0.76 for a tube with transverse louvers to 0.94 for an open tube. The illumination at any point on a horizontal plane may be found from the formula $(Ih/c^2)\ (e_1+e_2)$ where h is the height of the lamp above the plane, c the shortest distance from the point to the lamp, I the luminous intensity of the lamp (per unit length) in the direction of the point, as read from the light distribution curve in a plane normal to the axis, while e_1 and e_2 are two quantities found from curves given in the paper for three typical values of d. A worked example is given. J. W. T. W.

LIGHTING

628.971.6
690. Highway lighting without glare—A new lighting technique.
W. M. Waldbauer, *Illum. Engng*, **54**, 53-60 (*Jan.*, 1959).

To achieve adequate visibility with a minimum of glare in a street lighting installation, an optical system has been designed for use with 400-watt mercury discharge lamps giving a luminaire with a uni-directional beam aimed in the direction of the traffic flow. The design of the optical system has been developed from basic considerations of disability veiling brightness as applied to American turnpikes using dual carriageways with a 32 ft. dividing strip. Preliminary evaluations of the proposed lighting technique have been made ahead of the production of the new luminaire using conventional luminaires on a test strip of road. P. P.

691. Lighting of tunnels for traffic safety. 628.971.6
P. Jainski, *Lichttechnik*, **11**, 67-71 (*Feb.*, 1959). *In German.*

The first part of the paper is a treatment of the problem of tunnel lighting from first principles; the second examines the course of a driver's adaptation on entering a tunnel and describes various devices that have been used to assist this adaptation. An extensive table gives the principal characteristics and describes the lighting of a number of large tunnels in Europe and America. If a driver is not to be handicapped on entering a tunnel, very high values of illumination must be provided near the entrance and for some distance inside the tunnel. This necessitates a large number of lamps, e.g., over 500 in a length of some 500 metres. The lighting of approach roads is also considered. J. W. T. W.

628.971.6
692. Lighting of the tunnel in the first section of the urban autobahn in West Berlin.
W. Spriewald and R. Niedenfuhr, *Lichttechnik*, **11**, 72-76 (*Feb.*, 1959). *In German.*

This tunnel is 200 metres long and is double, the two traffic directions being completely separated. It is below the general ground level and at one end the roof is scooped out in horse-shoe shape so as to reduce the daylight illumination before the tunnel entrance is reached. The lighting is by 1,589 65-watt fluorescent lamps with a total consumption, including the automatic thyratron control of the basic lighting, equal to 258.4 kVA. One unbroken line of lamps on each side of each tunnel runs continuously but its intensity is regulated automatically according to the exterior illumination. Two further lines are added on each side when required; one extends for two-thirds and the other for one-third of the length of the tunnel. When the external illumination is high, yet another two lines per side are added, making ten in all for the first third, six for the middle third and two for the final third of the length. The illumination on the carriageway is approximately 12.5 lm/ft² per line of lamps in operation. J. W. T. W.

628.977
693. Study of an inspection problem in the textile industry.
R. Browaeys and J. Leplat, *Lux*, **26**, 123 (*Dec.*, 1958). *In French.*

Experiments were made on the errors of inspection of threads in a simulation of the conditions of inspection during the spinning operation, when the inspector walks between two banks of spinning equipment looking for broken threads on either side. The level of lighting, its direction, and the contrast of the threads with their background were varied, and the time required for the inspection and the number of errors were observed and treated statistically. It was found that the level of illumination had an effect which was small and not statistically significant, over the range 6 to 25 lm/ft². The contrast of the thread and its background had, however, a strong and highly significant effect. The direction of illumination had also a significant effect. The experiment also included the use of a background with features which permitted the inspector to keep her place while scanning alternately right and left. J. M. W.

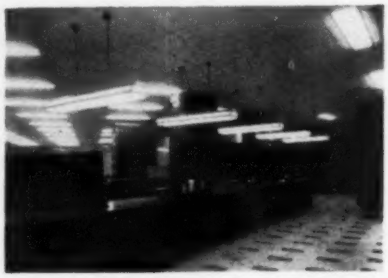
628.971.6
694. Illumination of the Wagenburg tunnel at Stuttgart.
P. Kass, *Lichttechnik*, **10**, 605-607 (*Dec.*, 1958). *In German.*

This tunnel is 830 metres long and curved. The main section has permanent lighting from fluorescent lamps at 3.9 metres spacing mounted at the sides of the roof. There is also an emergency lighting system. The illumination on the centre-line of the carriageway for most of the tunnel is about 3 lm/ft² and is very even. A large number of additional lamps are mounted near the ends of the tunnel and these are controlled automatically so that when the external illumination exceeds 2,500 lm/ft² the internal illumination near the portal is about 170 lm/ft², but this is reduced to 45 lm/ft² when the external illumination lies between 2,500 and 1,000 lm/ft² and is switched out altogether when the external illumination falls below 1,000 lm/ft². The special precautions taken to ensure reliability of operation are described. Just after cleaning the illumination is about 20 per cent higher than before. J. W. T. W.

695. Girls' school in Malmö. 628.92
D. Hellden, *Byggmästaren*, **37**, 74-75 (*A*4, 1958). *In Swedish.*

The school comprises a single storey building of 21 classrooms and a 5-storey building with offices, studies, laboratories, art, music and examination rooms, etc. The large spine corridor has a large clear sky-light. The daylighting was designed by G. Pleijel with the aid of detailed model studies. R. G. H.

LIGHTING INSTALLATIONS



Bank of West Africa, Gracechurch Street

The London office of the Bank of West Africa in Gracechurch Street has been reorganised to allow for further expansion. A suspended acoustic ceiling has been fixed and a Holophane recessed fluorescent system of optical louvres installed to provide an average of 40 lm/ft^2 with two 80-watt fluorescent lamps in each fitting. Pendant "Holoflux" fluorescent units are also suspended over the counters giving a general service illumination of 75-80 lm/ft^2. The architects were Ronald Ward & Partners.

Lloyds Bank, Bucklersbury

Lighting is a distinctive feature of the interior architecture of the new branch of Lloyds Bank Ltd., Bucklersbury House, London, E.C.4. The system, supplied by the GEC, forms an integral part of the overall design and provides visual interest for customers as well as an efficient working light for the staff. In the banking hall the area outside the central counter is lighted by 33 circular recessed fittings with inner louvres and with matt black rings to eliminate bright spots on the ceiling. Each fitting houses a 200-watt tungsten lamp. Over the counter area is a "drop" ceiling with a panoramic photograph of the City of London as a fascia. It is recessed into the true ceiling with a surrounding channel in which are 20 fluorescent tubes to illuminate counters and fascia. The architects were Campbell-Jones & Sons.

Lloyds Bank, Bond Street

New lighting in this bank consists of 30 modular fluorescent lighting units recessed into a Clarke & Fenn Echo-Stop suspended ceiling. The banking hall itself has 2 ft. x 4 ft. module fittings with flush bezels and is dominated by a central circular domed feature 17 ft. in diameter, lit from a concealed cornice by a double row of 80-watt fluorescent tubes. These are staggered in the cornice to eliminate shadows and the underside of the cornice has inset flush "Perspex" panels to emphasise the feature and to provide additional downward light. The general illumination value within the banking hall is approximately 30 lm/ft^2 using warm white fluorescent tubes. The lighting installation was designed and the equipment supplied by Ekco-Ensign Electric Ltd. The architects were Ansell & Bailey.

Lloyds Bank, Stevenage

Atlas "Domino" fluorescent units have provided a lighting installation of unusual design for Lloyds Bank at the New Town Centre, Stevenage, Herts. The general lighting for the banking hall is provided by two "Domino" formations—one in the form of a rectangle, the other a square. One formation is top-mounted around the perimeter of an existing laylight. The other has been top-mounted around an in-filling of acoustic tiles into which are set incandescent fittings from the Atlas "Display" range with concentrating lens attachments. Additional "Display" fittings are semi-recessed at the side of the banking hall to light the public space. The combined tungsten and fluorescent lighting gives a pleasant effect and the average illumination level in the banking hall is 25 lm/ft^2. The architects were Trehearne, Norman Preston & Partners.

LIGHTING INSTALLATIONS.........BANKS (contd.)

National Provincial Bank, Portsmouth

After operating for 17 years in temporary premises, the Commercial Road, Portsmouth, branch of the National Provincial Bank has moved into a new building. The dominating feature of the lighting system supplied by the GEC is in the branch's modern banking hall where a decorative "drop" ceiling of glass and acoustic plaster 112 ft. long is spanned by three 66 ft. lines of 2 ft. square modules lighted by 70 5 ft. and 3 ft. daylight tubes arranged in two banks. The rear of the ceiling comprises a laylight which is crossed by the three lines of modules and during the daytime the rear section of the ceiling lighting system can be switched-off so as to provide an even combination of natural and artificial light. The banking hall is finished throughout in Italian marble with tall, tapering decorative pillars at the entrance and along the walls.

A point of interest under the mosaic tiled canopy outside the entrance doors is a bronze relief map of Portsmouth which shows the main streets and places of historic and general importance. At night it is illuminated by three "Gecoray" reflectors housed in the soffit of its bronze framing.

The building was designed by the Architects' Department of The National Provincial Bank Ltd.

Trade Literature

A.E.I. Lamp and Lighting Co. Ltd., Melton Road, Leicester.—A new Catalogue providing a complete reference to the "Fiesta" range of fittings.

Benjamin Electric Ltd., Brantwood Road, Tottenham, London, N.17.—New general catalogue No. 1700 is a comprehensive guide to the Company's lighting fittings and in addition contains technical data and general lighting information. An export edition of the catalogue will soon be available.

J. A. Crabtree & Co. Ltd., Walsall, Staffs.—A new edition of the Electrical Handbook introducing new wiring methods and covering developments on wiring accessories and protective and automatic control gear.

Ekco-Ensign Electric Ltd., 45, Essex Street, London, W.C.2. A comprehensive price list covering a wide range of industrial and home lighting fittings, and giving details of the Company's Lighting Advisory Service. Also an illustrated price list of fluorescent control gear and accessories.

Hume Atkins & Co. Ltd., 66, Victoria Street, London, S.W.1.—Catalogue giving full details and prices of a range of school lighting fittings.

Falk, Stadelmann & Co. Ltd., 91, Farringdon Road, London, E.C.4.—Catalogue No. 814/58 illustrating the "Summit" range of fittings for fluorescent lamps.

Situations

Wanted

Executive Engineer.—25 years' lighting industry. With international reputation and contacts seeks position London area. Box 599.

Vacant

Assistant (Male or Female) under 30 years of age required for Lighting Division of a large industrial concern in the Enfield area, for photometric work. An original outlook and initiative more essential than previous experience in photometry. Science degree or qualifications in mathematics or physics necessary. Apply Box 598.

A vacancy will shortly arise for a Lighting Sales Engineer based in the London area. Applicants should be conversant with modern lighting practice and be able to discuss the subject with Architects and Users. A salary in the region of £1,000 per annum, plus commission, is envisaged for a suitable applicant. Write in confidence to the Sales Director, Box 600, giving full details of education and career.

Technical Assistant (Lighting) required capable of designing all classes of gas and electric lighting installations. Good technical groundwork in Illuminating Engineering and some experience in practical application. Technical qualifications an advantage. Commencing salary £833 rising to £903 per annum. Promotion prospects are good; free and other travel facilities. Superannuation Fund. Five-day week. Apply, giving details of experience and qualifications, to Chief Civil Engineer, British Railways, Southern Region, Waterloo Station, S.E.1.

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require experienced men for new posts in London and the Provinces

(a) **LIGHTING ENGINEERS** for work in connection with the design of lighting installations for industrial and commercial premises. Technical qualifications desirable.

(b) **COMMERCIAL ENGINEERS** to promote the application and sale of lighting equipment, including negotiations with Architects, Consulting Engineers, etc. Technical and sales experience desirable.

Staff Pension and Life Assurance Scheme. Write giving full details of age, qualifications and experience to Staff Manager, Atlas Lighting Ltd., 233, Shaftesbury Avenue, London, W.C.2

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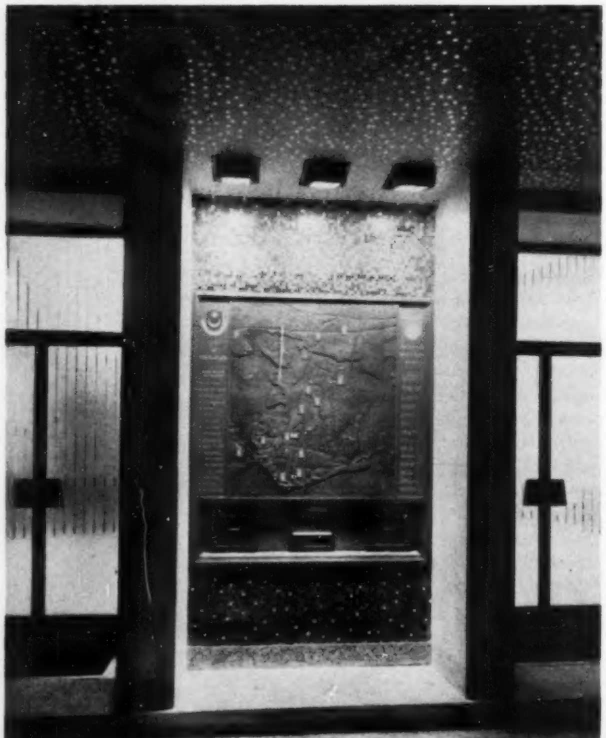

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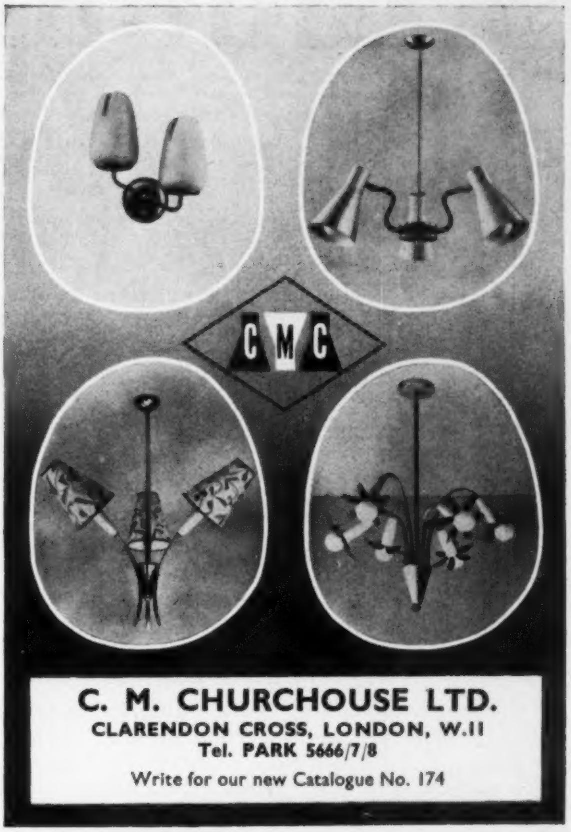

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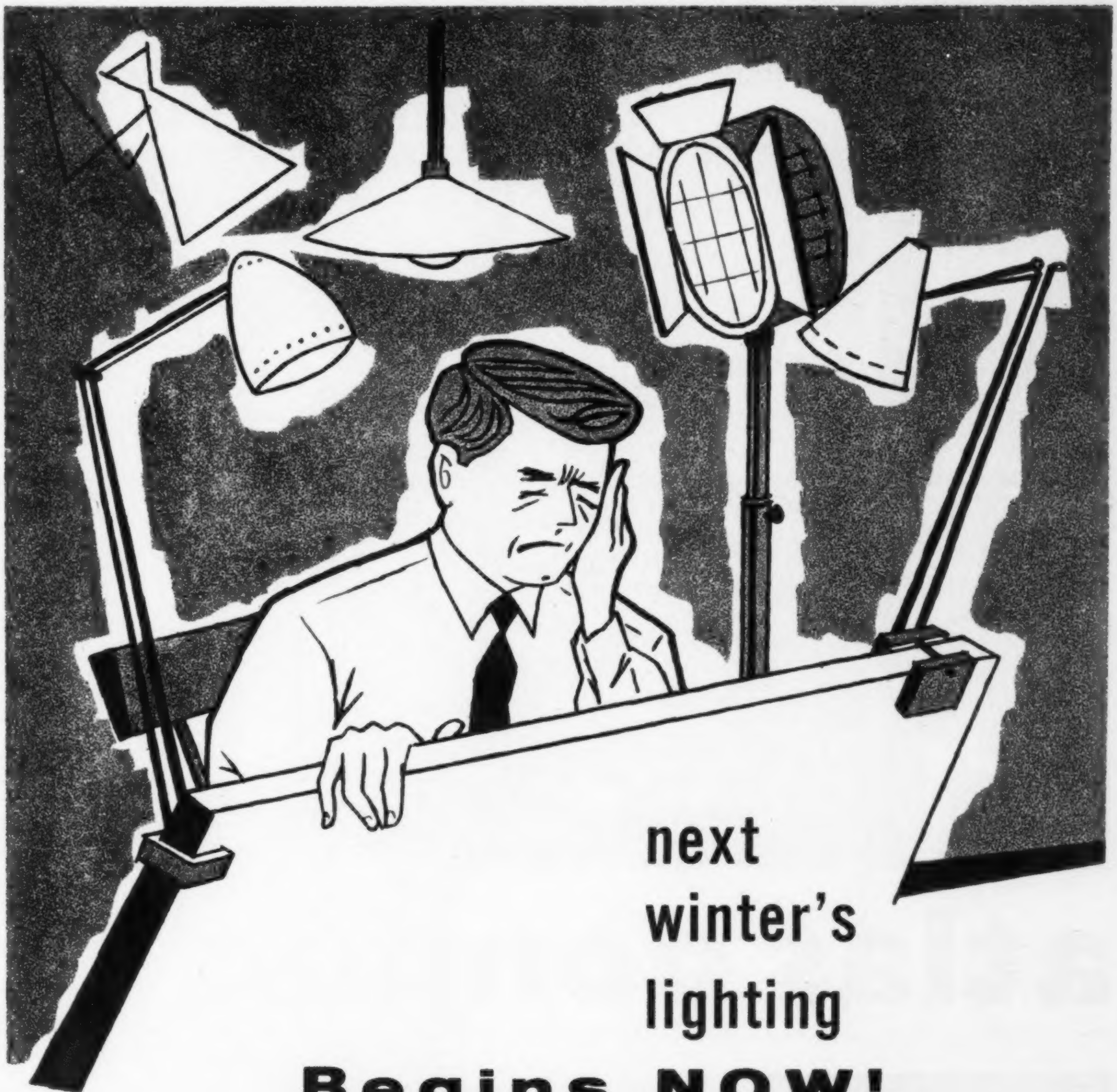
POSTSCRIPT By 'Lumeritas'

QUITE a lot of nonsense has been written on occasions to the effect that man, having evolved in daylight, is naturally best adapted to the very high levels of illumination provided by the summer sun. Sunshine is, of course, highly agreeable to most of us in our temperate clime and, indeed, we rarely get a surfeit of it. When we do, we can always take refuge in some shady place or don the dark glasses that are now so readily available for the purpose. Our particular part of the world, as well as many others, has a richness and variety of colour in the sunshine of the warmest months of the year that delights the eye: and our spirits tend to rise as the ambient brightness does, so long as the level of luminance does not strain our not unlimited capacity for adaptation.

But, in some lands, sunshine is by no means always the unmixed blessing that northern peoples think it. "Remorseless" and "pitiless" are terms that have been applied to it by some dwellers in tropical and sub-tropical parts, and it is a fact that habitations in these parts are designed to restrict the access of light instead of to facilitate it as is the present trend in temperate zones. An American army surgeon who has written on the effects of tropical light has little good to say of its intensity. And, of his own people, he writes, "we are the only people who have gone daft on the subject of admitting streams of powerful light into schoolrooms and nurseries —far more than is necessary to see well." He points to the toughness and survival of northern peoples through many millenniums in spite of their much lower "ration" of natural light, for example, the early cave and forest dwellers of Europe, the Eskimoes and others. On the other hand, a Russian medical writer of about the same period wrote, "we owe everything to light; without it life is impossible; it is light we are searching for all our lives everywhere . . ." It seems that whether we tend to be heliophiles or heliophobes depends partly on the part of the globe we happen to inhabit.

HOWEVER, leaving direct sunlight out of account, we in this country never experience an illumination from the whole sky of more than about 3,500 lm/ft^2. During most hours of daylight on most days of the year the whole-sky illumination outdoors is well below this figure. Even so, it is not right to suppose that our visual system has evolved with particular reference to photopic levels of illumination that are "sky high." In fact, one of the most outstanding characteristics of human vision is that it is designed to respond usefully under enormously different levels of illumination and is not adapted to one particular level more "naturally" than to another. While it is in any one state of adaptation the range of luminances to which the eye is sensitive is limited in a way analogous to that of a multi-range electrical measuring instrument when a selected shunt is in circuit. There is no merit in aiming to keep the eye in the highest state of bright adaptation when what we need to see does not call for the greatest acuity of vision. And, however much we enjoy sunshine for the vivid brilliance it imparts, it must—like all other sources of pleasure—be intermittent if it is not to produce satiation or, at least, become indifferent to us. For the visual system—in ourselves and in other animals—the conditions of luminance which can truly be said to be "natural" are *changing* conditions. The fundamental purpose of vision is to acquaint us with differences and changes in our luminous world and this purpose could not be served so well as it is if our "instruments" for seeing were preferentially "shunted" for the highest lights.

OPHTHALMOLOGISTS have beaten all the "illuminologists"—whether of the "New" or of the "Old" world—to a frazzel in the matter of "reaching for the sun." And I use the term "frazzel" not only to indicate colloquially that ophthalmologists are using light of solar and even super-solar intensity, but also because the effect of this ultra-solarisation is literally to frazzel or fry the illuminated tissue. To be less mysterious, what has happened is that a light coagulator has been devised and is now being used in the treatment of retinal detachment—a condition which, if not quickly repaired, leads to partial or total blindness—and in the treatment of certain kinds of tumour in the eye. The intensity of the light which this instrument can project into the eye can be adjusted to between two and four times that of the sun at the surface of our planet. This intensity is so great that at any local point of the retina to which it is applied the tissue is cooked. A detached retina can be made adherent again by a kind of spot-welding. Vision will be lost at such spots but this matters far less than the loss of vision over a large part, or perhaps the whole, of the normal field of vision which might otherwise occur. This operation by light instead of by cutting is painless so far as the retina is concerned, for the retina is, so to speak, "single-minded." It is highly specialised for sensing light but not for sensing pain. By "turning down the wick" the exact part of the retina which needs to be treated can be seen and, when thus accurately located, treatment can be applied immediately by increasing the light intensity to the necessary level.



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